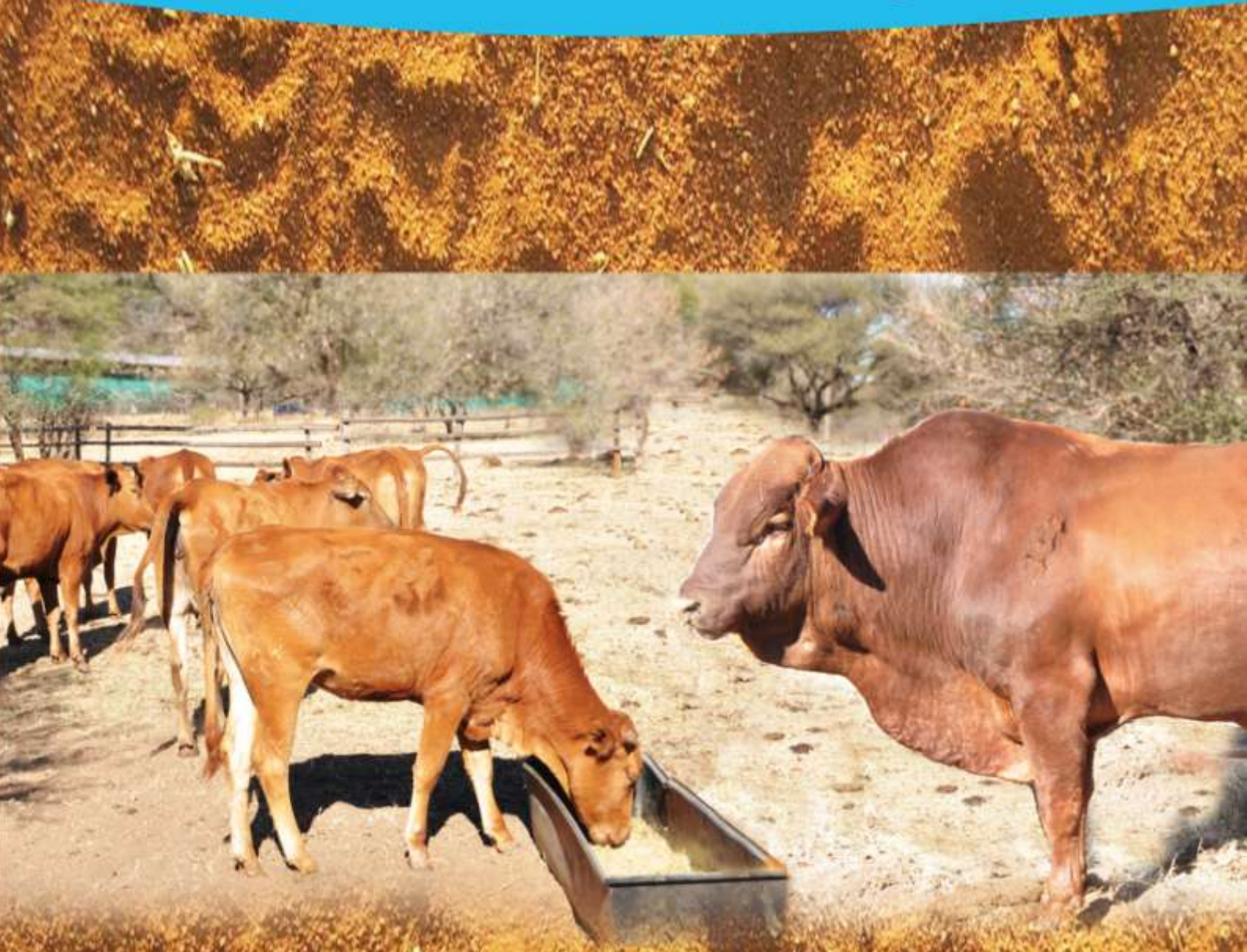
Botswana Agrifood Value Chain Project: Beef Value Chain Study



MINISTRY OF AGRICULTURE
BOTSWANA

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Botswana Agrifood Value Chain Project

Beef Value Chain Study

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Preface

Beef is the most important component of the agrifood sector in Botswana. It is an important foreign exchange earner, has many linkages along the chain, and is a source of income for a large segment of the country's population. As such, the beef value chain is important in terms of food security. But, despite its importance, the value chain has been facing a series of challenges that have constrained its performance. Productivity has stagnated or decreased over the last decade. The number of cattle entering the chain is constrained resulting in significant overcapacity in the processing sector and consequently low profitability for processors. Existing opportunities in local, regional and international markets are largely unexploited. In today's highly competitive and globalizing agrifood sector, including the livestock subsector, quality-based differentiation is a key success factor and branding is essential to signal the quality of the product. Also key is reliability of supply in terms of volumes, prices and quality throughout the year and from year to year. While Botswana struggles with these aspects, it is losing market share to its competitors.

To address these challenges, the Ministry of Agriculture of Botswana requested the collaboration of the Food and Agriculture Organization of the United Nations (FAO) to apply the value chain framework to analyse the beef subsector and to provide a set of strategic recommendations aimed at promoting its sustainable development and competitiveness. Funded through an FAO Technical Cooperation Programme facility, the study represents the first work under a new Botswana Agrifood Value Chain Project which is being driven by the Botswana Agricultural Hub. The beef value chain study will stand as a template for development support to other agrifood value chains.

The study is based on extensive consultation with stakeholders throughout the value chain: input suppliers, producers, processors, retailers, government officials and other support providers.

This timely study has been developed as part of FAO's technical assistance and demonstrates a continued commitment to the Ministry's approach to supporting the agricultural sector. It is expected that the recommendations – organized around public–private partnerships, institutional change, trade and market liberalization and knowledge-driven development – will provide a solid foundation from which Botswana's beef subsector can grow strongly toward a rewarding future for all its stakeholders. It is also hoped that through this study a wider audience can benefit from the information and analysis provided.

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None of the individuals mentioned above are responsible for the views expressed in this report, or for any inaccuracies; those responsibilities rest with the authors alone.

The authors
December 2012

Executive summary

Background to the study

This is the first study completed under the Botswana Agrifood Value Chain Project (BAVCP) which is implemented by the Ministry of Agriculture's Agricultural Hub and partly funded by the Food and Agriculture Organization of the United Nations (FAO) under Technical Cooperation Programme Facility TCP/BOT/3301.

Both government and private-sector representatives in Botswana recognized the need for thorough assessments of the country's main agrifood subsectors in order to guide the design of policies and programmes that promote competitiveness while taking economic, social and environmental sustainability issues into account. The project will address this need by conducting a set of studies that follow the value-chain paradigm. The first of these studies is on the beef value chain. Its primary objective is to provide practical and actionable recommendations for a sustainable and inclusive competitiveness strategy that will lead to development and growth in the beef subsector. The secondary objective is to create a template for the analyses of additional chains under the BAVCP.

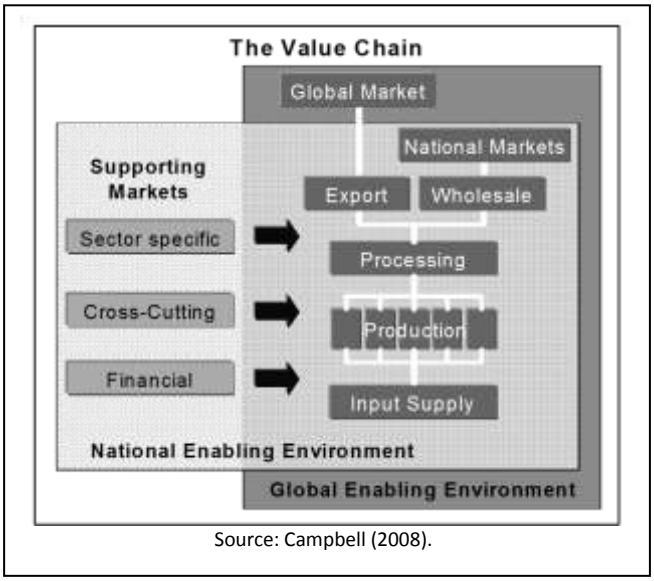
This is the first study completed under the Botswana Agrifood Value Chain Project (BAVCP)

The beef value chain was chosen first because of its importance in Botswana's agrifood system, the fast-changing nature of the markets in which it competes, the ongoing shift to a new production model and the momentum offered by current discussions on proposals for fundamental institutional changes. The beef subsector is the largest component of the agrifood system in Botswana. It earns significant amounts of foreign exchange and is a direct source of income for a large segment of the rural population. However, productivity has stagnated or decreased over the last decade or so. The supply of animals for slaughter for export has been constrained resulting in significant underutilization of processing facilities and consequently low profitability in processing. A failing traceability system blocked access to the key European Union (EU) export market for 19 months and a cattle disease outbreak further aggravated the situation in 2011. Existing opportunities in local, regional and international markets are not well exploited. As Botswana struggles, competitors such as Namibia and Brazil are expanding their share in these markets.

The value-chain development approach locates the key bottlenecks in the system, unearths their root causes and proposes holistic strategies for upgrading that lead to more competitive and sustainable farms and firms.

Value-chain approach

The value-chain development approach identifies the key bottlenecks in the system, unearths their root causes and proposes holistic strategies for upgrading that lead to farms and firms that are more competitive and sustainable. The value-chain approach assesses how value in an end market is created by a sequential chain of activities conducted by actors who are supported by various business-service providers and who are influenced by the particular business environment in which they operate. Value-chain analysis goes beyond behavioural assessments at the individual actor level by examining the nature of vertical linkages between suppliers and buyers and of horizontal linkages between agribusinesses of the same type. The end markets, actors and their linkages, service providers and operational environment are typically not static, but rather are evolving in various directions. Value-chain development takes these dynamics into account by looking at ongoing trends and by focusing on the key growth and upgrading opportunities.



Source: Campbell (2008).

While end markets are the starting point for value-chain analyses and competitiveness in them is the primary performance indicator, other sustainability indicators need to be considered as well. Achieving a higher level of competitiveness that generates increased profits for only a few is an undesirable outcome, if poverty reduction and increased food security are the primary objectives. At the same time, increasing competitiveness and profitability while irrevocably depleting natural resources is ultimately a self-defeating strategy. Value-chain analysis looks at the economic, social and environmental outcomes of various strategic options, including impact on the poor (sales, jobs, food supply) and on the environment (soils, water, biodiversity) and it looks at the trade-offs that often need to be made between these different objectives in seeking to develop sustainable and inclusive value chains.

This study of the beef value chain systematically assesses the beef value chain from farm to fork to derive practical recommendations that will maximize the desired impact. The objective for this study is to provide an analytical basis for the development of a vision and strategy for the beef value chain, both of which ultimately have to be developed by the stakeholders themselves. Information was gathered on a comprehensive set of issues through literature review, key-informant interviews, site visits and discussion workshops. The reports, articles and studies referred to in this text, and many more that provide background material to this study (over 200 in total) are on the CD that is included in this report, together with a customized financial tool, data sets and photographs.

End markets for Botswana beef

The current and expected export volumes of traditional beef-exporting countries such as Brazil and Australia, and those of rapidly growing exporters such as India, are important factors to take into account as Botswana plans how to structure and develop its beef export potential. Botswana is Africa's largets beef exporter, but it will remain a small player relative to these large global players, even if it can double or triple the volumes it exports through improved production, processing and marketing practices and structural change. Competition purely on price will be difficult because Botswana does not have the necessary economies of scale. Although price will always be a factor, Botswana will likely have more opportunities in differentiated high-value niche markets, such as branded quality cuts for top-end retailers or restaurants, or in the fast growing or newly emerging markets of smaller beef-importing countries where it can exploit its location and/or product qualities as competitive advantages. The market and trade analysis in this report indicates the importance for a beef-exporting country of understanding the dynamics of the markets it is exporting to, of building up an intelligence network and of having various strategic options that can be selected when the conditions and terms of trade change. In many countries such a task is vested in an independent body (e.g. a meat council, federation, board or association). Such organizations do not trade in meat, but gather information, work towards improving the sector's performance and promote their national product. Their financing is often organized through a levy system, with or without government support.

Botswana will likely have more opportunities in differentiated high-value niche markets

Globally, the supply of beef is still catching up with demand. As such, prices are expected to continue to increase for two or three more years, after which they are expected to level off and remain stable for the foreseeable future. The EU market remains a key target market for Botswana, but market diversification will be essential, given that the EU and South African markets account for 80 percent of Botswana's beef exports. Even as Botswana's advantages for market entry are eroding and competition increases, the EU market still offers the best value/volume option, especially if Botswana can move to a higher-value-added beef product. Increased diversification into new export markets will, however, be essential in any strategy developed for the value chain. Beyond the EU, the study highlights three sets of export markets: high-end non-EU markets in Europe, halal markets in the Middle East, and fast growing and nearby markets in sub-Saharan Africa. Partnerships with South Africa's supermarket chains and direct investment should be considered as further options in an African expansion strategy.

At the same time, the domestic market is on a clear long-term growth path and represents a key growth opportunity for communal farmers. Assuming that beef consumption in Botswana will grow at a moderate pace of around 3 percent in the next 10 years, the domestic market will grow to over 40,000 tonnes of bone-in beef by 2022, i.e. it will absorb an additional 14,000 tonnes per year – roughly 70,000 head of cattle. At that point, per capita consumption would be similar to current consumption in South Africa. If productivity and production (or imports) do not increase substantially over the coming 10 years, the exportable surplus will reduce by the same amount, i.e. 14,000 tonnes per year. If we exclude an estimated 4,000 tonnes of beef that is consumed by farmers or their neighbours, friends or family, the value of the domestic retail market can be estimated at 705 million Botswana Pula (BWP; approximately US$107 million), similar to the value of beef exports.

The EU market remains a key target, but market diversification will be essential

The beef value chain in Botswana

Within the overall beef value chain, four main channels can be distinguished:

1. **The export channel** (50 percent of 2010 offtake): This quality-driven channel is currently entirely controlled by the Botswana Meat Commission (BMC) and used the weaner system to reverse the downward trend in cattle supplies. However, persistent weaknesses in processing efficiency and (especially) in marketing undermined the financial health of the BMC, a situation which was dramatically worsened with the loss of access to the EU market in 2011 (regained in August 2012). As a result, the BMC has become increasingly dependent on government support. Direct supply to the BMC is fairly concentrated, but the cattle originate from a wide variety of farmers. In 2010, 64 percent of supplies came from 78 large direct suppliers, which included feedlots, cooperatives and agents. These three supplier types procure mostly from communal farmers. The study estimated that 85 percent of cattle supplies came from communal farmers as a whole, and 50 percent from smallholder farmers (defined here as farmers with herds of fewer than 150 head).

2. **The modern domestic channel** (10 percent of 2010 offtake): This quality-driven channel involves feedlot operations, modern processing facilities, branding and modern retail formats (supermarkets, cash-and-carry stores). Well organized on both the supply and the marketing side, this is the fastest growing part of the chain, taking share from channel 3. The supplier base is similar to that in channel 1.

3. **The domestic butchery channel** (30 percent of 2010 offtake): This price-driven channel still dominates domestic beef marketing, but appears to be under pressure to either upgrade (merge into channel 2) or shrink along with the lower-income urban and rural market segments it caters to. In this channel, butchers rely heavily on agents, municipal abattoirs and rural slab

butcheries. Products are less differentiated by quality than in channels 1 and 2. This channel also procures from a wide variety of farmers, but as it is less demanding in terms of standards and transaction costs it is an especially important outlet for the smallest-scale cattle producers who only occasionally sell into the market.

4. **Direct consumption by producers** (10 percent of 2010 offtake): Not really a channel, but representing a significant proportion of offtake and domestic consumption. This volume is largely not captured in the statistics.

The key dynamics in the beef value chain are:

1. the growth of the domestic market;

2. the growth of the modern channel within the domestic market; and

3. the growth of the feedlot system.

The drivers behind these dynamics are demographic changes (growth, urbanization, income and preferences) and the procurement and marketing strategies of the more modern processors. Feedlots have grown in importance because processors looking for quality, traceability, volume and supply consistency have offered incentives to producers (e.g. higher prices, lower transaction costs) and to feedlot operators (e.g. low-cost finance, shift to yard fees).

At the same time, these long-term drivers are influenced by more specific immediate factors, such as events in the natural environment (e.g. foot-and-mouth disease [FMD] outbreak in 2010, drought in 2012), events in the enabling environment (e.g. the failure of the traceability system to comply with key export-market requirements) and government policy (e.g. decisions that impact BMC management, support programmes and infrastructure). These factors often result in large year-to-year fluctuations in volumes. Value-chain-wide collaborations within the private sector or between the private and public sector have so far not been key driving factors.

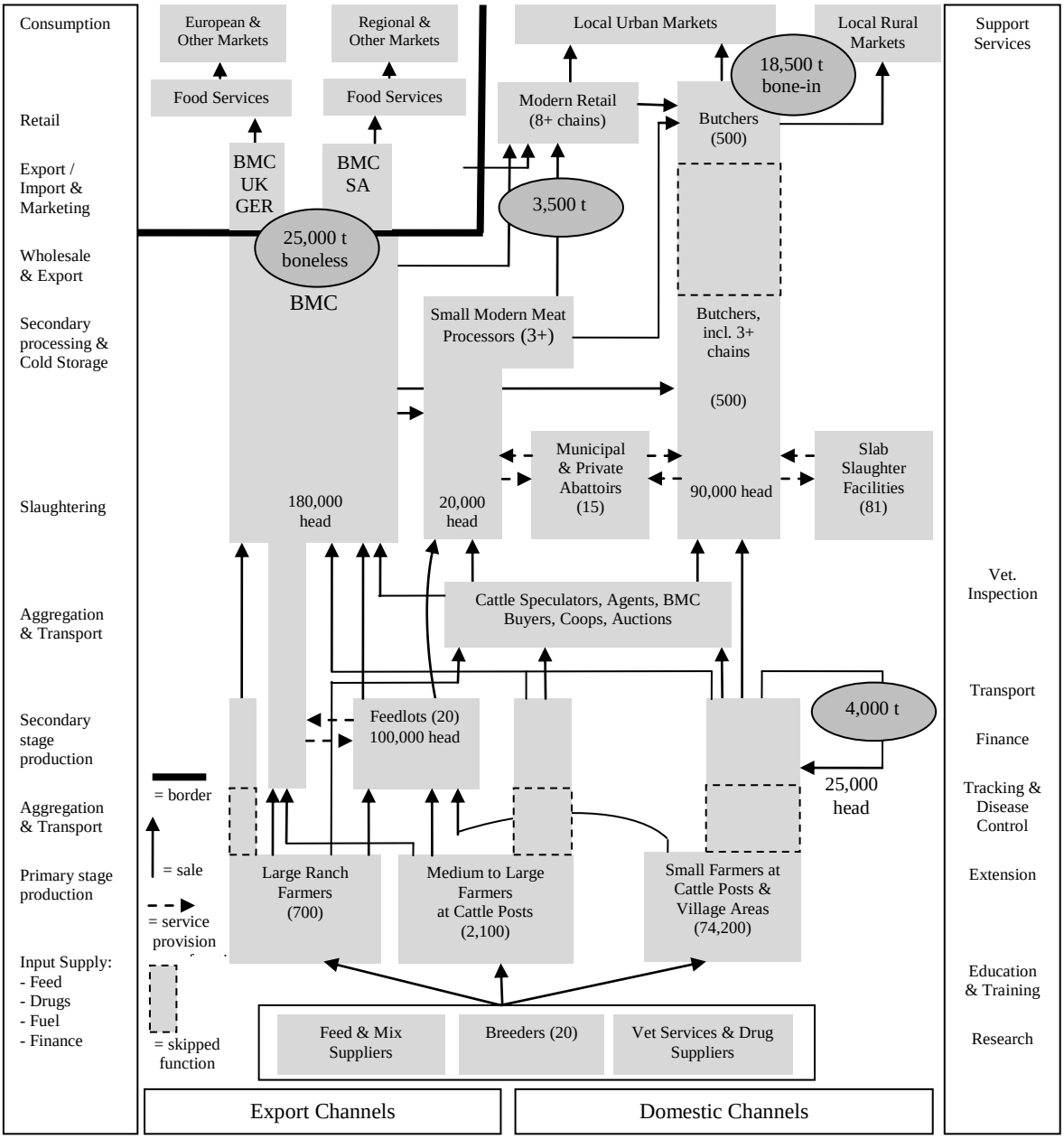
Based on realistic changes in production parameters resulting from a shift to new production practices (weaner system, holistic production), Botswana has the potential to more than double its current beef production from the same land area currently used for cattle production. Improvements in animal growth rate and cold dressed mass (CDM) (e.g. through improved breeds) could boost this potential even further. However, this technical potential does not mean such production levels are economically, socially or environmentally feasible or optimal. For example, the weaner system increases the need for feed that will most likely cost more in Botswana than some key competitor countries (whether imported or produced domestically) and therefore will have to be compensated for by higher market prices if commercial viability is to be achieved.

These issues are addressed in this report. For example, multilevel financial analysis indicates that current profitability levels are low throughout the value chain, at the farm, feedlot and (BMC) processing levels, with the scale of operations having a significant mitigating effect. The study found that shifting to more advanced farm management (e.g. improved feeding) increases costs more than it does revenues at current prices. However, some key informants believed that the study's assumptions (e.g. on increased calving rates) are too pessimistic. Furthermore, profitability and return on investment improve considerably under a higher price structure. The main conclusion from this is that additional in-depth studies based on primary data are required to make such assessments in sufficient detail.

The extent of the problems at the BMC, the main leverage point in Botswana's beef value chain, clearly points to the need for a complete overhaul, rather than change at the margins. The BMC Act is a unique and socially responsible piece of legislation but has been shown not to work in today's modern, globalized markets. Restructuring (and a return to stable profitability throughout the beef value chain) is seen by the Government of Botswana as a precondition for a possible privatization

of the BMC that has been discussed since at least 2005. Detailed prescriptions for such an overhaul have been available since 2007, but implementation has been slow and progress has been severely hampered by factors external to the BMC, most notably the loss of access to the EU market and the FMD outbreak in 2011. The BMC's legal and monopolistic status and social mission of "operating efficiently while producing maximum returns to producers," combined with a remuneration structure that is not well linked to financial performance and financial and executive dependency on the government, creates a difficult and somewhat schizophrenic operating environment for BMC management and undermines its ability to operate as an efficient business in terms of procurement, investment, processing, product development and marketing.

The Botswana beef value chain map (2010)



Driven by the social and economic importance of the beef subsector in Botswana, the government has over the years invested heavily in supporting the value chain, with a high level of direct involvement. Aiming to improve productivity, one large-scale government support programme succeeded the next. The Department of Veterinary Services (DVS) has taken on the full responsibility for so many activities (vaccination programmes, health inspection, disease-outbreak management, implementation of the Livestock Identification and Trace-back System [LITS] etc.) that it is undermining its ability to perform all the activities expected of it well. The persistent weak financial performance of the BMC has necessitated ever-increasing financial support from the government. The study estimated the overall cost of the government's programme of support to the beef value chain in 2010 to be BWP760 (US$130) per head of cattle sold (i.e. almost 20 percent of the sale price). At the same time, benefits appear to be accruing mostly to those who least need them and environmental concerns are becoming alarming. Ultimately, this extensive and almost entirely government-driven support appears to have increased dependencies and strained government budgets rather than creating a competitive and innovative beef value chain.

In order to realize the potential of the Botswana beef value chain, the stakeholders will need to come together and tackle all core weaknesses simultaneously, relentlessly and persistently.

An analysis of the strengths, weaknesses, opportunities and threats (SWOT) of the beef value chain conducted as part of the study essentially indicated that although there is a long list of weaknesses and a shorter but equally serious list of threats, the weaknesses can largely be addressed in a short (five-year) time period and the threats can be mitigated to an acceptable degree. At the same time, there are vast market opportunities that play to the strengths of Botswana beef and that, with the right strategies, could be exploited to a much greater extent than at present (they are currently barely exploited). The main challenge is that the beef value chain in Botswana is currently in a downward spiral, in which one weakness leads to another. Reversing this trend will require a major effort to fundamentally change the structure of the value chain. In order to realize the potential of the Botswana beef value chain, the stakeholders will need to come together and tackle all core weaknesses simultaneously, relentlessly and persistently.

Vision

The beef value chain in Botswana has a complicated structure and plays a multitude of roles. Owning livestock is a way of life for the Batswana. Livestock keepers are grateful for what the BMC, and by extension the government, has done and achieved. The government sees the livestock subsector as an important instrument to alleviate rural poverty. At the same time, there are serious doubts whether the current conventional production system is environmentally sustainable or cost effective. Some also query whether commercial beef production, as currently practised in Botswana, would be profitable without government support. The government will have to decide on how best to use land in future and arrive at a balanced way of managing resources, in which livestock, crop production and wildlife all have a place and contribute towards a more robust, less risk-prone and ultimately more-profitable resource-use system.

Against this backdrop, stakeholders in Botswana's beef value chain will have to agree on a vision for meat production and on the role beef production plays in that overall picture. A vision provides the objectives for the value-chain development strategy and should be realistic, quantified as much as possible and inspiring to stakeholders. While an example of such a vision is presented in this report, the final vision will have to be developed through a discussion and decision process involving all stakeholders.

Strategic recommendations

A core strategy needs to be chosen and developed in order to realize the chosen vision. A core strategy indicates the main strategic thrust, i.e. a broad statement that provides a compelling theme that knits together otherwise independent activities and focuses the energies of the various stakeholders on what complementary strategic actions are needed in order to realize the shared vision. Even though this vision is not yet finalized by the stakeholders, this report suggests that a differentiation strategy is the best option at this point in time, based on the findings of the SWOT analysis (high cost structure, high quality product).

Under a differentiation strategy, the focus is not on being the lowest-price supplier of commodity products, but rather on differentiation based on quality and uniqueness ("natural rangeland", "African pastoralist") in order to become more competitive in high-end export markets such as the EU and in high-end market segments such as upmarket restaurants, supermarkets and so on. Across all these markets, the common theme is to shift to an end-user driven, value-added strategy (upgrading, differentiation) for as much of production as possible. This would not only allow the capture of a higher margin, it would also play to significant trends in key markets such as the EU, e.g. environmental and animal-welfare issues. It would require positioning Botswana at the top end of the market in terms of compliance with various standards. This would entail a further shift toward the weaner system and associated changes, including contracts, product development, improved packaging, branding, market research, marketing investment, a national standard, selling further down the value chain and so on. This approach is associated with continuous investment and upgrading at all levels and a high level of value-chain integrity to achieve market-responsiveness.

Even with a core strategy chosen, there has to be sufficient flexibility in the specific elements of the strategy to adapt to the very distinct wants and needs of the different types of cattle producers. As indicated before, it is essential to take into account culturally relevant factors such as expectations, norms and daily practices when trying to upgrade the value chain. For example, smallholders may need mostly financial support and capacity building, emerging medium-sized farmers may need more access to land and technology, and larger farmers may benefit most from policy changes and subsector-wide collaboration.

An overview of the various strategic actions to be considered is presented on the last page of this executive summary. The individual relevance of each action depends on the core strategy and vision chosen, and on their interdependencies in terms of achieving impact. Nevertheless, the report identifies some activities that are considered high priorities because they address the weakest points in the chain that, if not addressed, will have immediate, large and negative impact on the overall performance of the chain. Each of the strategic activity options is discussed in more detail in the body of the report, with some indication of cost, impact (how much, on whom, on what), dependency on complementary activities and which organizations would be likely drivers.

Essentially, three pillars support the core strategy.

Pillar 1: Partnerships and institutional change

The high degree of direct government involvement in Botswana's beef value chain has proven to be both ineffective and costly. Greater involvement of the private sector, largely through public–private partnerships, and new, performance-driven institutions can bring about a potent collaboration that can provide the foundation for a stronger and more profitable beef value chain.

There are a number of key actions that will need to be taken to promote such partnerships and institutional change.

- **Fundamentally revise the LITS system:** Transfer the implementation part of LITS to a new, independent entity with a governance structure that reflects its public–private partnership

nature as part of the realization of a new system of official controls that fully complies with EU requirements. Data-entry will pass to the value-chain actors themselves. This will free up resources at DVS to allow it to focus more on its role as auditor. This change will have to be supported through legal/regulatory change and capacity-development programmes. A well-functioning LITS is essential for accessing higher-priced, premium markets and for re-entering the EU market.

- **Fundamentally restructure the BMC:** Convert the BMC into a fully market-driven corporate entity in order to improve its operational and marketing performance and its ability to initiate a market-differentiation and diversification strategy for Botswana's beef exports. This implies: (1) bringing in a core management team with a strong track record in managing all core areas, from procurement to processing to marketing; (2) creating a strong, performance-based incentive system for management; (3) providing management with sufficient freedom to implement industry best practices and to restructure the staffing, the facilities and the holding as needed to achieve efficiency and effectiveness; (4) establishing a normal corporate board function which includes government, farmers and leaders from the financial sector and the business community; and (5) accommodating all necessary changes to the BMC Act. If performance cannot be improved sufficiently under the current zero-profit model, it is strongly recommended that BMC be privatized and become a regular profit-driven firm with a shareholder structure in which farmers of all scales are well represented and from which they benefit through profit-sharing arrangements.

- **Develop a Meat Council of Botswana:** Reflecting another public–private partnership, but mostly driven by the private sector, such a council (or association or board) would provide a discussion platform and industry advocacy group and take on a number of issues essential to the competitive performance of the beef value chain, such as market research and promotion, conducting performance benchmark studies, developing a national beef standard and so on.

- **Strengthen farmer groups at various levels:** Promote the organization of cattle owners into cattle management groups for each cattle post, with these groups being linked to regional and national apex organizations. These management groups could be based on the cooperative format and would facilitate links to programme-support and commercial services (e.g. finance, transport, veterinary services), provide economies of scale and bargaining power in input procurement and marketing, integrate smallholder farmers into the BMC shareholder structure, promote the use of contracts, advocate for smallholders (e.g. in a Meat Council) and so on.

- **Other examples:** While the four strategic recommendations listed above are considered priorities, the study also proposes various other forms of public–private partnership. These include, for example, the DVS contracting with private veterinarians and the establishment of one-stop farmer support centres that combine DVS offices and livestock advisory centres with commercially-based input suppliers and service providers.

Pillar 2: Trade and market liberalization

Where there is insufficient competitive pressure, the beef value chain will not operate efficiently, will not upgrade and will not innovate to the degree that is necessary to achieve competitiveness in the market place. There has to be a competitive structure in place that can generate benefits before efforts are made to assure that the distribution of benefits is in line with social objectives. In other words, the thinking is reversed, from trying to make a sociopolitical objective economically efficient to making an economic objective sociopolitically effective.

The following actions are recommended.

- **Gradually liberalize beef exports to improve export performance:** Linked to the restructuring of the BMC indicated above, remove the export monopoly of the BMC in

stepwise fashion (e.g. by awarding export quotas to other processors) to achieve a healthy level of competition.

- **Gradually liberalize the export of live animals:** This could be achieved by, for example, awarding export quotas. This could initially be targeted to areas that are now overstocked and that do not have easy access to internal markets. Subsequently, and depending on the findings of detailed impact assessments, it could be broadened to include higher-value animals (including weaners) so as to assure a true regional export parity price for weaners and to promote a supply response that will make more quality animals available for value-adding in Botswana.

- Other: While the above two strategic recommendations are considered priorities in this area, the study identified various other strategic options, such as building a trade-based feed-supply base, imports of weaners from Zimbabwe or Namibia based on compartmentalization, harmonization of beef processing and product rules within the region, allowing for the import of low-cost beef so as to free up quality Botswana beef for more rewarding export markets (a second stage option given the risk of undermining access to the domestic market by smallholder producers), and so on.

Pillar 3: Knowledge-driven development

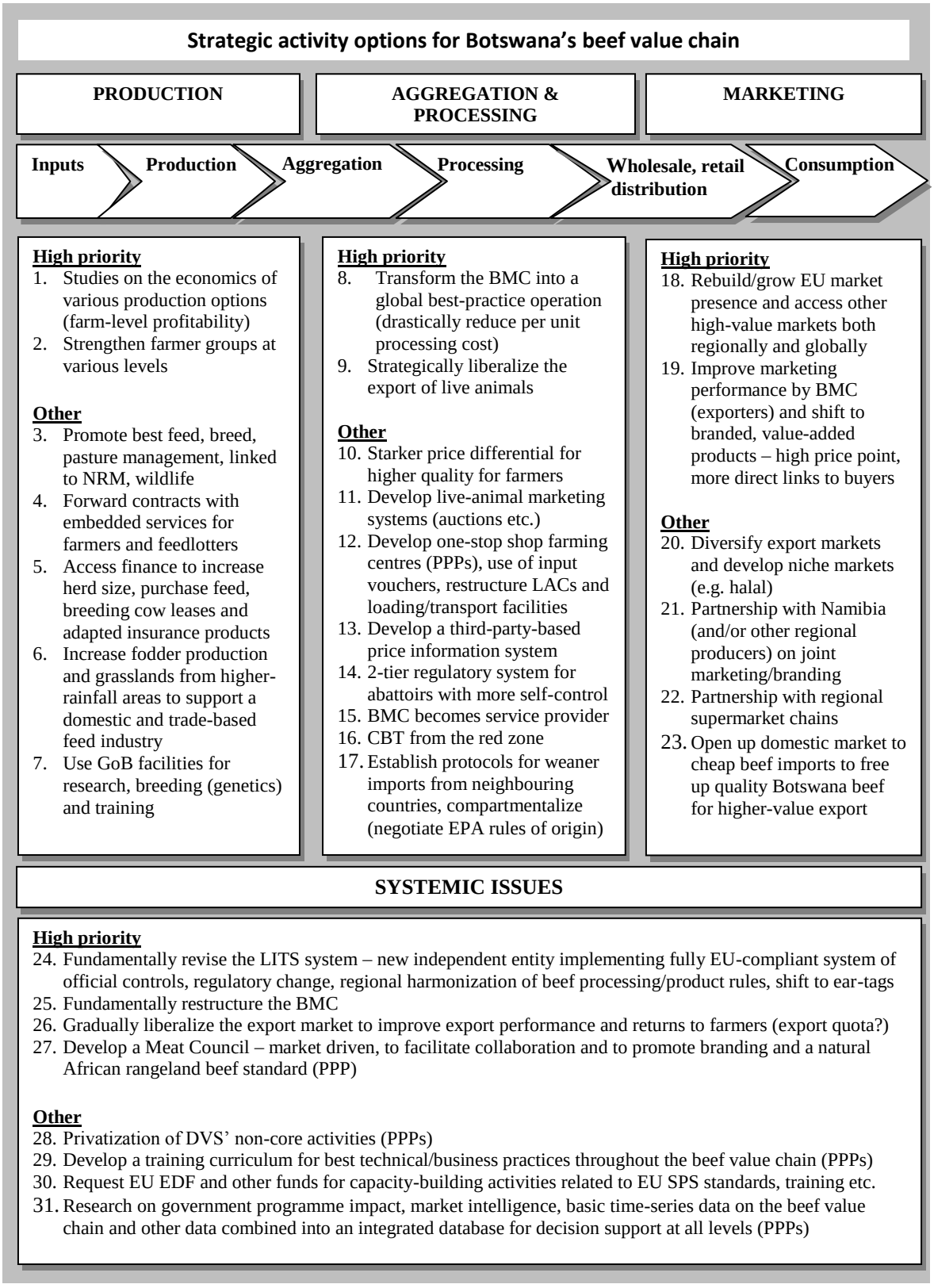
A competitive value chain is a knowledge-driven value chain, i.e. quality data are present and stakeholders are able to use them effectively. One important current weakness in the Botswana beef value chains encountered during this study is the dearth of quality data throughout the value chains. Unless they know the quantitative economic, social and environmental impact of a change in policy, business practice or technology, value-chain actors are operating in the dark. Equally important is trend-analysis, which requires the systematic gathering of data that are accurate, reliable and up to date.

It is therefore proposed that the stakeholders in the Botswana beef value chain make considerable investments in the systematic collection and dissemination of data on all levels of the value chain and in the training of stakeholders on how to use the data for improving performance. State-of-the-art methods should be used to develop a revised LITS in which reliable information can be found on every animal and on every cattle holding. The LITS database in turn should be linked to disease-management information systems. Investments should be made in one-off, in-depth analyses of, for example, policy changes, and in systematic assessments of farm profitability in collaboration with selected farmers, perhaps conducted by the Botswana College of Agriculture. These profitability assessments could be linked to measuring trends for key performance indicators such as calving rate, CDM and so on. Data on prices in a variety of markets should be systematically collected and published, ideally by the Ministry of Agriculture, with a frequency that meets managerial needs (daily or real-time) and that uses modern information and communication technologies. Farmers should be trained in the effective use of the data (e.g. how to use the profitability tool developed in this study). Changes should be made in the curricula of formal education institutions in order to build the capacity needed to create the knowledge base. The impact of new technologies generated through research and development should be assessed quantitatively. A Meat Council of Botswana could play a central role in the execution and management of this process, as could other forms of public–private partnerships.

Conclusion

A competitive and adaptive beef value chain requires that three sets of elements are in place simultaneously: capacities of stakeholders, incentives for stakeholders and an enabling environment. We saw the large impact that improved incentives had in the growth of supplies to the BMC between 2007 and 2010. This was not sufficient to put the Botswana beef value chain on a path of sustained growth because: (1) the incentive structure for the BMC was not sufficient to improve its performance (e.g. for the BMC's marketing team in the United Kingdom); and (2)

weaknesses in the LITS system. The strategic options proposed here imply a new partnership between the public and the private sector; a partnership to effectively implement a strategy of fundamental structural change that will address all three aspects – capacities, incentives, enabling environment – simultaneously, and thus has a real chance of setting the Botswana beef value chain and all of its stakeholders on a stable path to a vibrant future.



Acronyms

ACP	African, Caribbean, and Pacific
AED	United Arab Emirates dirham
ASEAN	Association of Southeast Asian Nations
BAVCP	Botswana Agrifood Value Chain Project
BCPA	Botswana Cattle Producers' Association
BEDIA	Botswana Export Development and Investment Agency
BIDPA	Botswana Institute of Development Policy Analysis
BMC	Botswana Meat Commission
BSE	bovine spongiform encephalopathy
BVI	Botswana Vaccine Institute
BWP	Botswana pula
CBNRM	community-based natural resource management
CBPP	contagious bovine pleuropneumonia
CBT	commodity-based trading
CDM	cold dressed mass
CEDA	Citizen Entrepreneurial Development Agency
CIF	cost, insurance and freight
COD	cash on delivery
CPA	cattle-post area
CSC	Cold Storage Commission
CSO	Central Statistical Office
CVO	Chief Veterinary Officer
DCP	Direct Cattle Purchase initiative
DVS	Department of Veterinary Services
EC	European Commission
EDF	European Development Fund
EDI	electronic data interchange
EPA	Economic Partnership Agreements
EPP	export parity price
FAN	Farm Assured Namibian
FAO	Food and Agriculture Organization of the UN
FAOSTAT	FAO Statistics
FAPRI	Food and Agriculture Production Research Institute
FMD	foot-and-mouth disease
GAP	good agricultural practice
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GHP	good hygiene practice
GMP	good manufacturing practice
GoB	Government of Botswana
HACCP	hazard analysis and critical control points
HGP	hormone growth promoters
HQB	high-quality beef
IEPA	Interim Economic Partnership Agreement
ILRI	International Livestock Research Institute
ISO	International Organization for Standardization
ISPAAD	Integrated Support Program for Arable Agriculture Development
ITC	International Trade Centre
LAC	Livestock Advisory Centre
LIMID	Livestock Infrastructure and Management Project
LITS	Livestock Identification and Trace-back System
LMIA	Livestock and Meat Industries Act, 2006
LU	livestock unit

LW	live weight
MERCOSUR	Mercado Común del Sur (South America)
MIS	management information system
MLIA	Meat and Livestock Industries Act
MLU	mature livestock unit
MoA	Ministry of Agriculture
MZM	Mozambique New Metical
NAD	Namibian dollars
NDP	National Development Plan
NPAD	National Policy on Agricultural Development
NPN	non-protein nitrogen
ODI	Overseas Development Institute
OIE	Office International des Epizooties/World Organization for Animal Health
PPP	public–private partnership
PPR	peste des petits ruminants
RFID	radio frequency identification
RMAA	Red Meat Abattoirs Association (South Africa)
RVF	Rift Valley fever
SACU	Southern African Customs Union
SADC	Southern African Development Community
SIC	Standard Industrial Classification
SOP	standard operational procedure
SPS	sanitary and phytosanitary
SWOT	strengths, weaknesses, opportunities and threats
TGLP	Tribal Grazing Land Policy
TIFI	Trade, Industry, Finance and Investment department of SADC
UAE	United Arab Emirates
UMIC	upper-middle-income country
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
VGA	village grazing area
WB	World Bank
WTO	World Trade Organization

PART I Introduction

1 Study background and objectives

This is the first study completed under the Botswana Agrifood Value Chain Project (BAVCP). The BAVCP was first proposed by the Botswana Cattle Producers' Association (BCPA) in 2010 and formally initiated in 2011 by the Agricultural Hub at the Ministry of Agriculture (MoA) with technical assistance from the Food and Agriculture Organization of the United Nations (FAO). The latter funded this study under a Technical Cooperation Programme Facility (TCP/BOT/3301).

Government and private-sector representatives recognized the need for thorough assessments of the country's main agrifood subsectors in order to design policies and strategies that promote competitiveness while taking economic, social and environmental sustainability issues into account. The project aims to address this need by conducting a set of studies that follow the value-chain paradigm. The first of these studies is on the beef value chain; its primary objective is to provide practical and actionable recommendations for a sustainable, inclusive, competitiveness strategy. The secondary objective is to create a template for the analyses of additional chains.

The beef value chain was chosen first because of its importance in Botswana's agrifood system, the fast-changing nature of the markets in which it competes and the momentum offered by current discussions within Botswana on proposals for fundamental institutional changes.

The beef subsector is the largest component of the agrifood system in Botswana.[1] It is a significant source foreign exchange[2] and is a direct source of income for a large segment of the rural population. As such, livestock are seen as a way of alleviating rural poverty and many services for the livestock sector, which elsewhere would be a private good, have been made a public good in Botswana. However, productivity in the beef chain has stagnated or decreased over the last decade. The supply of animals for export slaughtering is constrained resulting in significant overcapacity in processing and consequently low profitability in processing operations. Existing opportunities in local, regional and international markets are not well exploited. As Botswana struggles to meet the demand of its core markets, competitors such as Namibia and Brazil are expanding their share in these markets.

Since many Botswana families own cattle, numerous Batswana are a stakeholder in and potential beneficiary of government support to the beef value chain. The cultural value attached to livestock and the esteem in society from owning large numbers of livestock still apply, even as Botswana society has changed dramatically in many other respects since independence. It is thus particularly difficult for policy-makers to evaluate the impact of measures and to reach policy and strategy decisions that would facilitate urgently needed changes in the beef value chain to maximize social welfare for the population as a whole, and to benefit both smallholder and large-scale farmers. A case in point is the proposed revisions to the Botswana Meat Commission (BMC) Act, the central piece of legislation in the beef value chain, which are currently being discussed in parliament; legislators are considering the ramifications for smallholder producers, commercial producers, the processing industry and the government itself.[3] These and other aspects are further discussed in Section 3 and analysed in Parts II and III of this report.

[1] The poultry subsector, with its highly concentrated commercial section, appears to be catching up (Botswana Guardian, 2011).

[2] This is relative. In 2010, beef exports were worth around US$110 million, the export of diamonds was worth over US$3 billion.

[3] These discussions focus on whether or not to maintain the BMC's monopoly on cattle and beef exports.

The beef value chain in Botswana has been extensively studied already, most notably in an elaborate analysis conducted for the Ministry of Finance and Development Planning (BIDPA 2006), so why yet another report? There are several reasons. First**,** many of the studies were conducted around five years ago (ITC/BEDIA 2005; Jefferis 2005; Stevens and Kennan 2005; Abelprojects 2006; BIDPA 2006; GoB/WB 2006; BMC/GRM 2007; Jefferis 2007a, 2007b; ODI 2007) and many developments have taken place since. These include the demand shock effect of the 2008 economic crisis; the ever-more-challenging standards and changing trade agreements, which influence trade patterns; and the increased consolidation in global meat processing and retailing, which changes the structure of the value chain. This new analysis thus provides a timely update on the current state of affairs. Second, these past studies typically highlighted particular aspects of the chain, rather than taking a systems perspective. For example, some studies highlight cattle pricing (ITC/BEDIA 2005; Jefferis 2007a, 2007b), another focuses on the shift from an oxen-based to a feedlot system (Abelprojects 2006), while yet another zooms in on the impact of disease management on trade in the beef value chain (Mapitse 2008). The study at hand will bring the content from these previous reports together in an overall value-chain framework. Third, and most importantly, a value-chain approach in the way it is planned here will put all the key issues on the table in a clear, comprehensive and systematic way and as such will provide an excellent platform for a dialogue between the public and private sectors on vision and strategy formulation.

2 Value-chain methodology

The value-chain approach is first and foremost a systems analysis tool. It assesses how value in an end market is created by a sequential chain of activities conducted by actors who are supported by various business-service providers (e.g. banks, transporters, extension agents, input providers) and who are influenced by the particular business environment in which they operate. Value-chain analysis goes beyond behavioural assessments at the individual actor level by examining the nature of vertical linkages between suppliers and buyers (e.g. contracts between farmers and processors) and of horizontal linkages between agribusinesses of the same type (e.g. farmer associations).

These linkages are depicted in a value-chain map with some indications on the numbers of agents, product-flow values and volumes and key points of leverage. The latter are points in the system at which many actors connect or through which high volumes of product flow (e.g. a large processor, a geographic cluster) or that affect the value chain as a whole (e.g. policy). The end markets, actors and their linkages, service providers and operational environment are typically not static, but rather are evolving in various directions. Value-chain development takes these dynamics into account by looking at ongoing trends and by focusing on the key growth and upgrading opportunities.

While end markets are the starting point in this approach and competitiveness in them is the primary performance indicator, other sustainability and performance indicators need to be considered as well. Generating increased profits from a higher level of competitiveness that benefits only a few is an undesirable outcome if poverty reduction and food security are the objectives. At the same time, increasing competitiveness and profitability while irrevocably depleting natural resources is ultimately a self-defeating strategy. Value-chain analysis looks at the economic, social and environmental outcomes of various strategic options, including impact on the poor (sales, jobs, food supply) and on the environment (soils, water, biodiversity) and examines the trade-offs that often need to be made between these different objectives in seeking to develop sustainable and inclusive value chains.

Once the inner workings of the system (value chain) have been examined in sufficiently detail and understood, it becomes possible to prioritize the sets of interlinked constraints that need to be addressed and the opportunities that should be pursued in order to maximize the desired impact.

The desired impact should be derived from a vision, the development of which is essential for the design of an upgrading strategy. By definition, a strategy needs a clearly specified and quantified goal. In value-chain development, strategy refers to the upgrading that needs to take place in the form of a policy change, introduction of a new technology, development of a new product,

establishment of a new or different linkage, provision of a new service and so on. The strategy is then translated into a detailed commodity development plan that specifies what should be done when and by whom. The value-chain development process then moves from analysis and planning to implementation.

In its specific execution, there are many varieties of value-chain development. The particular one followed here combines elements of approaches used by FAO and the United States Agency for International Development (USAID). Although there are quantitative elements to the analysis, such as the quantification of volumes, values and stakeholders in the value-chain map and assessments of profitability at various levels of the value chain, the approach is predominantly focused on a qualitative analysis of the structure of the system and how it changes over time. The aim of this is to identify those upgrading strategies that will be most likely to achieve the stated vision for the value chain. For further reference, introductions to the value-chain-development approach applied here can be found in da Silva and de Souza Filho (2007), Campbell (2008) and Neven (2009), while more practical guidelines can found in USAID (2009).[4]

This beef value chain study systematically assesses the beef value chain from farm to fork to derive practical recommendations that will maximize the desired impact. The objective for this study is to provide an analytical basis for the development of a vision and strategy for the beef value chain, which ultimately have to be developed by the stakeholders themselves. Information was gathered on a comprehensive set of issues (see Annex 1) through literature review, key-informant interviews (see Annex 6 for the list of key informants), site visits and discussion workshops. The report is the outcome of a three-stage process, comprising a launch stakeholder workshop that provided a first sketch of the value-chain map and analysis of the strengths, weaknesses, opportunities and threats (SWOT) facing the value chain, a data-collection and analysis stage, and a findings review workshop that discussed the preliminary conclusions and provided guidance for completing the report. A reference group established by the Agricultural Hub in combination with these stakeholders' workshops assured a broad consultative process in reviewing the work. The actual field study was conducted between May and September 2011 and in April 2012 by a team consisting of MoA staff and international and national beef experts commissioned by FAO.

3 Brief history and review of Botswana's beef subsector

3.1 Pre-independence era

Cattle have been an important part of Botswana's historically pastoralist culture from long before independence in 1966. Traditionally, the Batswana have been cattle keepers and many of them still are, including those in town.[5] A semi-nomadic type of husbandry was practised in arid and semi-arid areas, cattle herds following vegetation and seasonal water sources. In the pre-colonial era (prior to 1889) the primary purpose of keeping cattle was as a means of subsistence livelihood and as a safety net, with animals providing milk, draught power and, sold one or two at a time, funds to meet pressing cash needs (Mulale 2002). (The same still holds true for many smallholders today.) Cattle were the main form of wealth. The national cattle herd in 1950 counted a few hundred thousand animals.

[4] For more information, see: microlinks.kdid.org/good-practice-center/value-chain-wiki.

[5] If we assume that an average household in Botswana has 4.5 members, then for a population of 2 million, there are around 450,000 households. Given that there are an estimated 77,000 cattle farms, we can estimate that roughly one in six households in Botswana is involved in cattle farming. Given that there are an estimated 130,000 farmers, we can state that nearly 60 percent of farmers are cattle producers.

The colonial government (1889–1966) introduced more water points and improved veterinary services, which opened up more grazing land but with little consideration for environmental impacts. The national herd grew steadily and an ample supply of cattle was available for export. In 1949, the British Colonial Development Corporation made available a large grant for drilling boreholes in Botswana, leading to an even faster growth of the cattle herd (Mulale 2002).

In order to move away from live cattle exports to South Africa and with demand shifting from regional markets to the British market, the colonial government stimulated beef processing for export to Europe and in 1952 constructed for this purpose an abattoir along with a cannery and a tannery in Lobatse, an old industrial town 70 km from the capital Gaborone (Parry 2009). To this day, this is the largest meat-processing facility in the country, with a slaughter capacity of 650 head per day (169,000 head per year). The establishment of this facility created a dual slaughter system consisting of a formal export channel through the Lobatse abattoir and a traditional system of slaughtering at home or at rural slab butcheries. In 1953, cordon fences were erected to direct the movement of animals from various parts of the country through corridors and quarantine stations to the Lobatse abattoir.

Picture 1: Borehole with pump

Picture 2: Traditional well with pump

At independence (1966), with 95 percent of the population of 500,000–600,000 living in rural areas and with agroclimatic constraints offering few other opportunities, rearing cattle had arguably become the most important component of the economy, with a cattle herd estimated at 1–1.3 million head and accounting for around 40 percent of gross domestic product (GDP). Exports of beef had also become the country's source of main foreign currency. At that time, nearly all cattle production was still based on extensive grazing on communal lands, although a few more-intensive commercial farms existed. Furthermore, private ownership of boreholes was creating an increasingly skewed distribution of livestock holding.

Picture 3: A cordon fence in Botswana

3.2 Emergence of the Botswana Meat Commission, 1965–1983

Just before independence, the BMC was established in 1965 under the BMC Act. Several other acts aimed at regulating the trade of cattle and cattle by-products such as hides and at the management of animal diseases came into effect at this time (Mapitse 2008). The BMC[6] has the mandate to promote the development of the country's livestock industry in general and the interests of livestock producers in particular, and to market the country's beef and related products globally. Specifically, it was tasked with slaughtering and selling at the highest prices and the lowest costs possible all livestock available to it (Hubbard and Morrison 1985). It was furthermore statutorily obliged to distribute to its livestock suppliers all surpluses over and above its operational costs and contributions to a legally stipulated contingency reserve. This means that any decreases in meat prices or any increases in costs are passed on to the cattle suppliers in the form of lower prices and/or lower surplus payouts, unless these are temporary and can be smoothed out with the BMC's reserve funds (Hubbard and Morrison 1985).

Picture 4: Cattle Herding in Botswana

After some growing pains, the cattle purchasing system with its associated surplus distribution entitlements and quota components started to work well and by 1975 around 200,000 cattle were being supplied to the BMC annually. Commercial farming operations on fenced ranches increased in importance in this period, in part as a result of the Tribal Grazing Lands Policy (1975), which provided for the fencing of cattle ranches by individuals on communal land made available on 50-year leaseholds. Over time, ranches on freehold and leasehold land came to account for 30 percent of the national herd (Mapitse 2008). Annual cattle supply levels remained high until 1984, albeit that they fluctuated between 140,000 and 240,000 head as a result of cyclical patterns in production related to droughts and disease outbreaks (ITC/BEDIA 2005). Preferential access to the European market with tradable quotas was firmly established under the Lomé Convention (1976) and maintained since under the Cotonou Agreement (2003) and an Interim Economic Partnership Agreement (IEPA) since 2009.[7] Thanks to these good cattle supplies, the BMC processing facilities operated at close to capacity and the resulting cost efficiencies, combined with increased exports to the lucrative European market and to markets in the region, resulted in substantial year-to-year price increases to producers between 1975 and 1984. By 1984, the export channel had come to dominate the beef value chain in Botswana.[8]

[6] The BMC is a statutory corporation without share capital. As such it is not a parastatal, but, like a parastatal, it could be privatized if such a decision were to be made. The GoB has only a small equity stake (200,000 Botswana pula in 2009) and does not share in its profits (Bank of Botswana 2010). The government had, however, become a significant creditor to the BMC in 2010–12.

[7] However, Botswana is currently at risk of permanently losing this preferential trade status (EC 2011a).

[8] As an indication of this dominance, municipal abattoir slaughter volumes were 15 percent of BMC slaughter volumes in the mid-1980s (data provided by the Department of Veterinary Services).

3.3 The beef subsector in crisis and structural change in the economy

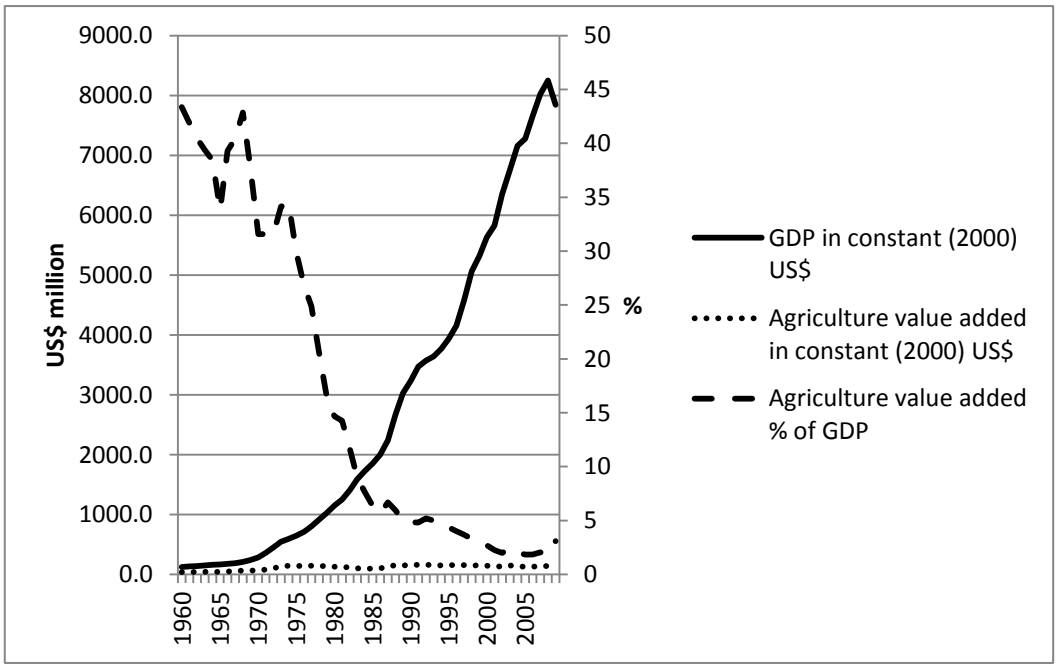
The seemingly successful growth of the national beef industry came to a sudden halt in 1984 and a period of depression began from which the subsector would not recover for the next 25 years. There were several direct reasons for this sudden crisis. One was inefficient management, with allegations of managerial extravagance and corruption voiced in the National Assembly, which lead to a cessation of surplus payments to farmers in 1985 (Hubbard and Morrison 1985). The flat-rate cattle-pricing system applied by BMC did not reflect variable beef market prices and did not facilitate a levelling out of cattle supplies throughout the year (supplies drop off outside of a flush season). The quota allocation became meaningless when quotas became too large and fines for non-delivery (the "liquidated damages system") were not sufficiently enforced. Furthermore, as many farmers did not meet their quotas, the BMC had to resort to emergency supplies ("short calls") for increasingly large parts of the supply. These emergency supplies were drawn almost entirely from a few large suppliers who have holding grounds near the abattoir, thus undermining the social role of the BMC in promoting the interests of producers in general.[9]

At the same time, the BMC faced growing costs, such as higher producer prices, higher operating costs, higher income tax as a result of increased sales, exchange rate losses because of the appreciation of the pula and drought-related costs. Over time these cost increases eroded the trading surpluses and in 1983 the BMC dipped in its reserves to pay bonuses to farmers, thus undermining future investment in facilities or transferring the costs of such investments to future generations of producers or to the government. However, more-fundamental reasons for the crisis are associated with the seemingly conflicting goals of the BMC: to offer high prices and a guaranteed market for all producers on the one hand (social role) and to develop a competitive beef industry that generates tax and foreign exchange on the other hand (economic role). The BMC Act's requirement for the processor to "operate efficiently (world best practice)" creates an incentive to procure from the most competitive farmers only, rather than from all farmers.

Part of the reason for the crisis can be found in the rapidly and dramatically changing nature of Botswana's economy. The 1967 discovery of diamonds, exported since 1971, provided the government the financial means to engage in extensive development and support programmes. GDP grew rapidly, driven by the growth of the diamond industry, which in turn stimulated growth in other industries such as trade, banking and real estate. This rapid GDP growth, combined with a slow, near-stagnant growth of the agriculture sector, led to a dramatic decrease of the relative share of agriculture in GDP from over 40 percent in 1960 to less than 2 percent in 2008 (Figure 1). In 2009–10, in the wake of the 2008 global economic crisis, this trend was slightly reversed as the agriculture sector grew faster than mining (34 percent vs 22 percent), resulting in agriculture accounting for 2.7 percent of GDP in 2010 (Bank of Botswana 2010). This growth was driven in part by government support programmes. Government development expenditures on economic services to agriculture, forestry and fisheries jumped from 100 million Botswana pula (BWP) in 2000/01 to almost BWP700 million in 2008/9 before falling back to BWP273 million in 2010/11. Development expenditure covers core programmes such as control of foot-and-mouth disease

[9] This dependency on a small number of large suppliers (farmers and feedlot operators) has persisted, partly because these larger suppliers can more easily comply with the high sanitary standards of the EU market.

Figure 1: Agriculture in Botswana's gross domestic product (GDP), 1960–2008 (in real terms)



Source: Authors, based on World Bank indicators

(FMD), vaccine production, animal health centres, improvements in disease control and the veterinary diagnostic laboratory (BIDPA 2006).

Rapid GDP growth had a dramatic impact on the population demographics and the domestic market. The population grew, urbanized and got richer. The urban population grew from less than 30,000 in 1966 to over 1.2 million in 2010. Real GDP per capita grew from less than BWP1,000 in 1967 to more than BWP13,000 in 2010,[10] making Botswana the second richest country in sub-Saharan Africa in per capita terms (after Equatorial Guinea). In turn, this created a new, rapidly growing and increasingly quality-conscious urban market. In the beef value chain, domestic beef consumption grew fast (Markandya 1996, cited by Stevens and Kennan 2005) and as a consequence of a beef import ban (and a 40 percent import tariff imposed by the Southern African Customs Union (SACU) a new (third) market channel emerged for local beef (alongside the export channel and the shrinking traditional rural channel): municipal and private slaughtering facilities were established to process cattle purchased by traders/ speculators/agents on behalf of butchers who emerged to service the growing urban middle-class. This provided an alternative market that is easier to access and less risky than the BMC (in terms of animals being condemned, e.g. for "beef measles" (beef tapeworm cysts), in terms of rejection for low quality and in terms of delayed payments), especially for Botswana's smaller-scale beef producers operating on communal land.

Over time, communal land and ranch farmers alike increasingly sold their animals into this channel, and by the early 2000s the domestic urban market channel was roughly equal to the export channel in terms of numbers of animals absorbed (BIDPA 2006). With its higher overhead costs and with its throughput having been reduced as a result of large numbers of cattle diverted via the domestic market channel to butchers, it has become difficult for the BMC to compete with the

[10] World Bank indicators available on the web: http://databank.worldbank.org/. However, this wealth is not equally distributed; Botswana has the fifth highest Gini coefficient (which measures income inequality) in 1994 (latest available), and 30 percent of the population lived below the poverty line in 2003.

other slaughtering facilities in the domestic urban market. Even so, the BMC does sell a small volume of fresh, frozen and canned beef (under its ECCO label) to butchers and smaller meat processors supplying local supermarkets.

Picture 5: ECCO beef and competing products

The development of mining and the associated emergence of an urban service economy also affected the production side of the beef value chain. Young people found jobs in urban areas or went to study abroad on government grants and did not return to the traditional way of life. The new urban professionals did, however, keep their animals in the rural areas. Slowly but surely the livestock husbandry system changed from a hands-on management system with elements of transhumance[11] to a sedentary, largely absentee-owner, cattle-post system, concentrated around boreholes with exclusive or shared syndicated water rights. The day-to-day management fell to herd boys with little knowledge and limited resources to manage the cattle beyond providing them with water. The absentee owners visit the cattle post or farm a few times each year to take stock of their cattle and to instruct the herd boys.

As commercial cattle production became less lucrative, and even loss-making, as a result of declining producer prices paid by the BMC from 1985 until the mid-2000s, and with the rise of absentee-owner management, many farms stopped investing in breed improvement, feed and infrastructure, falling back on a minimum input production system that is low-yielding and almost like "gambling" (invest little, hope for low mortality rates, sell what survives). As low-cost, low-quality cattle are readily sold into the growing urban market channel and as fewer animals are sold to the BMC, processing costs per unit in the export-market channel increase, driving down prices that can be paid to producers.

Picture 6: Water supply at a cattle post

3.4 Government response strategies

In order to reverse this downward trend, the Government of Botswana (GoB) embarked on various support programmes, such as the following examples.

[11] Transhumance is the seasonal movement of people with their livestock.

- The 1991 National Policy on Agricultural Development strengthened the fencing strategy that was initiated under the Tribal Grazing Lands Policy. This programme introduced fencing of communal areas to award exclusive grazing rights with the aim of stimulating more responsible range resource use.

- The MoA introduced subsidy schemes, such as the Services to Livestock Owners in Communal Areas (SLOCA) programme and the Livestock Water Development Programme (LWDP). In 2002 these were combined into the Livestock Management and Infrastructure Development (LIMID) programme, which is the current core support programme and focuses on cattle and other livestock. These programmes provide grants to cattle farmers for fencing and boreholes. LIMID provides direct subsidy-based support in terms of animal husbandry inputs, fodder and borehole construction.

- Initiatives under the National Development Plans tried to increase the low offtake rate in the traditional farming system by building cattle-holding kraals, loading ramps and auction facilities[12] in strategic areas.

- Selected free veterinary services were provided by the GoB.

Picture 7: Loading ramp for cattle

Further government support or facilitation strategies are envisioned. One strategy considered is the use of the Banyana farm[13] as a centre for cattle-breed improvement through the supply of breeding stock and for training traditional farmers in the agronomic and business practices of commercial cattle production (MoA 2008). Another possible new government strategy that emerged in 2007 and is currently being debated in the National Assembly is a fundamental revision of the BMC Act, which could remove the BMC's export monopoly.[14] Smaller meat processors interviewed for this study indicated that this monopoly blocks them from lucrative export opportunities in the

[12] Livestock auction facilities have been developed in Gaborone and Selibe Phikwe to encourage offtake. The facility in Selibe Phikwe was reported to be well utilized and increased offtake in the surrounding areas. Cattle that were not auctioned off to speculators and butchers satisfactorily were for a small fee trucked by the responsible livestock cooperative to the Francistown abattoir on behalf of the farmers (Mapitse 2008).

[13] Banyana (Pty) Ltd is a farm purchased by the GoB from the Commonwealth Development Corporation in 1998. It is currently managed under the auspices of the MoA with the objective of creating an efficient, productive and sustainable cattle-breeding and restocking venture. The farm comprises 149,000 ha of leased land (mostly leased from the Department of Lands) on which there are 73 cattle posts, 235 camps and 46 boreholes with distribution pipelines to the different camps. Its primary business is cattle production and the selling of breeding stock and stock for slaughter.

[14] The Act as it is now does not exclude non-BMC firms from requesting a permit to export beef: "21. Control of export of cattle and the licensing of export slaughter-houses – (1) No person other than the Commission shall export cattle or edible products from cattle from Botswana unless he is in possession of a permit in writing to do so issued by the Minister under this section. (2) No such permit shall be issued without the concurrence of the Commission or unless the Minister declares by order published in the Gazette that by reason of exceptional circumstances it is in his opinion clearly in the public interest to issue such permit without the concurrence of the Commission."

Southern African Development Community (SADC) region (mostly South Africa). Some commercial farmers in western Botswana interviewed during the study indicated that the currently forbidden live export of weaners[15] to South Africa would bring in live-weight prices that are double those in Botswana. One argument in defence of the single exporter model is that it may be necessary in order to achieve the economies of scale needed to meet the highly demanding and costly sanitary and phytosanitary (SPS) and other supply-chain requirements of the increasingly competitive EU market and similar high-value markets.

Picture 8: Cattle wandering on communal land

The costs of these programmes are considerable, with one study estimating that in 2002 the annual government support per unit of cattle was BWP100 or US$17[16] (BIDPA 2006). Our estimate for 2010 is similar in magnitude (see Section 10). Notwithstanding this considerable investment, these programmes had only a limited impact because they were insufficiently implemented and because lowering the personal investment by producers without changes in the cattle marketing structure only enforced the gambling strategies referred to above. These programmes also diverted some of the economic activity away from cattle to other livestock (e.g. goats and game) as part of a diversification strategy and cattle's share in total livestock units has decreased over time in Botswana (GoB 2007). Furthermore, government services are hard to target exclusively at the poorer livestock farmers and often those who should be considered capable of paying for such investments and services also take advantage of them. Consequently, producer yields and herd offtake remained low over the period 1985–2009 and BMC-supplied volumes remained in the range of 120,000–160,000 head per year, i.e. roughly 50 percent of the installed capacity of 286,000 head per year (ITC/BEDIA 2005). Revenues from beef exports dropped dramatically during this time.

3.5 BMC response strategies

At the BMC level, various initiatives were taken in order to reverse the tide and to address the conflict between its social and economic objectives.

The first initiative, rather ill-advised from an efficiency point of view, was to increase capacity through the construction of abattoirs in Ngamiland (Maun) in 1983 and in Francistown in 1992. This increased the BMC's processing capacity by 50 percent to 286,000 head per annum. Although

[15] A weaner is a calf of 6 to 12 months old taken away (weaned) from its mother. Also included under weaners in this report are tollies (long weaners), which are cattle that are too light at 9–12 months to go into the feedlot and that are kept longer on the grazing land, entering the feedlot at 18–24 months. Most of the feedlot animals in Botswana fall in the tolly category, so that it is more a tolly system than a weaner system. In line with common terminology used in Botswana, however, we refer to it in this report as the weaner system.

[16] Based on US$1:BWP5.83 (oanda.com – 31/12/2006). For a five-year old ox sold at, say, BWP3800 (2012 price), this government support cost would represent BWP500 or 13% of the value of the live animal. From another perspective, this BWP500 is in the same order or magnitude as the farmer's variable cost per head, as estimated in Section 6 of this report.

this increased the cattle intake for a single year (1992), the additional investment costs and increased costs related to greater overcapacity further undermined the competitiveness of the BMC without providing much benefit to producers.

The second initiative was to change the pricing structure in two essential ways. The first approach was to move to a regional export parity price (EPP) system, whereby producer prices are brought more in line with those in South Africa. Under pressure from the BCPA, an initial flat-rate 40 percent increase in prices in 2006 (Abelprojects 2006) was replaced after six months by a true regional EPP which required a 70 percent increase instead of the 40 percent increase.[17] The second approach was to introduce transparent prices that vary by quality grade and season and thus promote a more even supply of higher-quality cattle and cattle that yield higher cold dressed mass (CDM) throughout the year and across years (reducing the effect of drought-based cycles of selling and stocking by smallholder producers). The quality premiums, if sufficiently large, could potentially improve profits at both the farmer/feedlot-operator and the processor level.

A third initiative was to promote a shift from an oxen production system to a feedlot system in which cattle are first reared on grazing land up to a certain weight and then finished on a total mixed ration in a feedlot. In order to incentivize the feedlot system, in 2008 the BMC altered its policy of not involving itself before the abattoir gate through the Direct Cattle Purchase (DCP) initiative. This initiative involved buying tens of thousands of weaner cattle and having them fattened to slaughter weight in feedlot operations that received a yard fee from the BMC.[18] As with the variable pricing system, a feedlot system would smooth supply over the year, improve cattle quality[19] and could lead to an improvement of profitability at the production level, depending on feed costs and availability.

Picture 9: Cattle in a feedlot

A fourth initiative was a change to a more professional, experienced management structure, which initiated a move to more-efficient marketing operations (e.g. size reduction of the sales team). The latter could have a great impact on the revenue side, while simultaneously trimming costs.

[17] It must be noted that EPPs are for slaughter-weight animals and not for weaners. As indicated before, some farmers claimed that the direct cattle purchase scheme was paying half of what they would be able to get for their weaners in South Africa. Empirical verification of this was beyond the scope of this study. A further consideration to take into account is that abattoir prices in South Africa are based on animals fattened using growth hormones, which is more cost efficient (cheaper to produce) and which cannot be done in Botswana as long as it exports to the higher-value EU market, which prohibits the use of growth hormones. The regional EPP does not take this into account.

[18] When the DCP started (2008), GoB lending to the BMC shot up, with loans outstanding in March going from less than BWP10 million over the period 2001–2008 to around BWP240 million in 2009 (Bank of Botswana 2010). This interest-free, eight-year loan with three-year grace period did not only help finance the DCP but also included BWP75 million for upgrading the Maun facility (BMC 2010). In 2009, around 60 percent of the outstanding BMC borrowings of BWP250 million came from interest-free government loans, the rest from commercial bank overdrafts.

[19] Quality in terms of the physical characteristics but not in the sense of the quality-image of grass-fed beef.

Until the 2011 setback resulting from a new FMD outbreak and the loss of access to the EU market, these initiatives were beginning to pay off; BMC throughput increased steadily from 113,000 head in 2007 to 180,000 head in 2010. In line with this growing intake, the value of annual frozen and chilled beef exports (to all markets) increased from US$112 million to US$157 million over the same time period.[20] This is a strong performance, considering that the value of these exports were in the range of US$60–US$80 million between 2001 and 2006.

3.6 Disease management in Botswana's beef subsector

A critical element of Botswana's export-oriented beef value chain since colonial days is its disease management system, which is monitored and largely implemented by the MoA's Department of Veterinary Services (DVS). The latter's main objective is to detect disease outbreaks early, most notably FMD and contagious bovine pleuropneumonia (CBPP), and quickly eradicate them, in order to be in compliance with the standards of the World Organization for Animal Health (OIE) and the European Commission (EC) (Mapitse 2008). These dictate that beef from FMD-infected zones cannot be exported to non-infected zones, such as the EU.[21] Outbreaks of CBPP in 1994 and of FMD in 2003/04 were quickly contained, demonstrating Botswana's strength in this area, although outbreaks of FMD in 2007 and 2011 were not as easily brought under control.[22]

The DVS' specific responsibilities include the inspection of meat-processing facilities, the implementation of an animal-traceability system and the provision of export licences. However, critical weaknesses in the execution of these responsibilities emerged. In a January 2011 audit by the EC, the DVS was found to operate a traceability system (the Livestock Identification and Trace-back System, LITS) that suffered from systemic failure and to have certified the BMC's cannery facilities despite knowing that they were in violation of EC market standards (EC 2011b). Subsequently, the BMC abattoirs were for the first time in their history not issued certificates by DVS and, at the insistence of the EU, were removed from the list of approved export facilities for

[20] ITC Trade Map data (www.trademap.org). Categories: 0201 Meat of bovine animals, fresh and chilled; and 0202 Meat of bovine animals, frozen. These numbers should be used in terms of trends rather than absolute values. Estimations of these export values based on our value-chain mapping are far lower (e.g. US$110 million in 2010). Whether this is caused by limitations in the ITC data or in the data received in Botswana, or perhaps by differences in exchange rates used, could not be ascertained in the context of this study.

[21] FMD is caused by a highly contagious virus that spreads rapidly in cattle, pigs, goats and sheep and causes large blisters in the mouth and around the hooves. FMD does not have a high mortality rate but the associated pain is great, often resulting in lameness and anorexia, which in turn leads to very poor condition, greatly decreasing the animal's value. Recovery is slow and, accounting for time and extra feed spent bringing the animal back up to a selling weight, expensive. The most economically efficient option, and the standard protocol for most of the world, is to kill the entire herd to prevent spread and cut losses. A vaccine is available but its use makes screening for the virus impossible because tests cannot distinguish between vaccinated and early-stage infected animals. Thus, vaccinated animals cannot be exported, and if an animal is positive on screening it and any animals at risk (any animals near that one) must be euthanized. Furthermore, the country where that animal is from is labelled as FMD positive and no exports will be accepted from there until that country is able to prove, based on OIE inspections, that it does not have the disease any longer, i.e. all animals are seronegative (Golas 2011).

[22] BMC communication. Nevertheless, when the 2007 outbreak in Ngamiland (vaccinated zone) spilled over to Ghanzi (disease free without vaccination) in 2008, the latter district was able to regain its disease-free status within three months in accordance with the OIE standards through culling affected herds and those at risk. This was possible largely because of early detection and response to infection, excellent farmer cooperation and good political support (FAO/SADC 2009). The 2011 FMD outbreak was possibly the result of illegal animal trafficking across the Zimbabwe–Botswana border near Francistown in the north-east, with farmers in Zimbabwe's Matabeleland being attracted by the higher prices around the BMC abattoir in Francistown. GoB attempted to fence this border in 2006 but abandoned the effort in favour of more border patrols (Scoones *et al*. 2010).

the EU market. Since many markets, including those in the region, are increasingly using EU standards in their own markets, the BMC, and thus Botswana, were effectively shut out of their most important export markets for 19 months (January 2011–August 2012), resulting in an annual loss estimated here at BWP140 million (US$18.5 million).[23] BMC coping strategies included keeping animals longer in feedlots (at high cost), halting the purchase of cattle (in conflict with its legal mandate), finding and developing alternative markets and selling larger volumes of beef in the local market.

3.7 Botswana's beef subsector today

In 2012, Botswana's beef value chain finds itself in some of the most turbulent waters in its history: a dependency on a limited set of increasingly competitive traditional export markets; new market opportunities that competitors are exploiting faster (e.g. Nigeria, China, Middle East); a new BMC management structure embarking on new procurement, production and marketing approaches based on best business practices and global industry benchmarks; a growing domestic market on which BMC operates only in a limited way, undermining BMC's competitiveness in the export market; a traceability system that failed to the point of leading to exclusion from the country's most important export market; persistent poverty in rural areas, with many poor households still critically dependent on cattle and a BMC system that does not benefit them; a preferential trade-agreement that is under pressure; a shift from an oxen-based system to a weaner/feedlot system with its complex set of links to feed markets, carrying capacity, meat quality, processing efficiency and smallholder involvement; a new outbreak of FMD in 2011; and other challenges. Parts II and III of this report analyse these various factors in greater detail through a value-chain-development lens. These analyses are then used to identify strategic options in Part IV.

[23] This is based on the assumption that around 7000 tonnes of fresh cuts (based on 2010 trade statistics) have to be sold in the South African market at an average price of BWP30/kg instead of to the EU markets for an average price of BWP50/kg. The price differential in frozen cuts is small between these two markets.

PART II Value-chain analysis

4 End markets for Botswana beef

4.1 Introduction

This section provides an initial scanning of the market opportunities that drive value chain development from a Botswana perspective. Detailed studies involving visits to export markets and consumer surveys are beyond the scope of this study. Furthermore, the beef market in any given country is not homogenous, as different cuts, quality grades and service levels target different market segments. An overall market may be depressed, but within it a particular niche market may be thriving. Although essential, analysis at the segment level is addressed in this report only to the degree that it could be extracted from accessible reports and data sets. It is strongly recommended that the industry or the GoB commission detailed market studies based on gathering primary data.

Here we present the main opportunities in broad strokes based on secondary information, trade statistics and commentary from stakeholders in the value chain and outside experts. There are five parts: (1) the global beef market; (2) Botswana's beef trade patterns; (3) the EU and other markets outside of sub-Saharan Africa; (4) market opportunities in sub-Saharan Africa; and (5) the domestic market. A concluding subsection compares the opportunities.

4.2 Dynamics of the global beef market

4.2.1 Current status

Global beef production was estimated at 55 million tonnes in 2010 (FAPRI-ISU 2011), with 75 percent of this beef being produced in Brazil, China, the EU and the United States. Around 7.5 million tonnes of this (14 percent), valued at over US$30 billion, were traded globally in the same year.[24]

Table 1 lists the 25 largest net exporters of beef in 2010. Some large exporters, such as Germany, the Netherlands and the United States, are also large importers, reducing their net exports of beef. The higher unit values for beef exported from Belgium, Ireland and the Netherlands are most probably the result of a high percentage of veal and baby-beef (i.e. young bulls less than 2 years old with 0–2 teeth) in the overall export package. For these countries, the price per kilogram exported is higher than that per kilogram imported, hinting at a replacement of higher-value beef for export with lower value imported beef for the domestic market. The high unit value of beef from Argentina is in part due to the grass-fed origin of cattle in that country. Depending on quality, grass-fed beef products can sell for twice as much as their grain-fed counterparts. However, an ongoing shift to feedlot operations and increasing demand from the domestic market are reducing supplies of grass-fed beef from Argentina. Combined with rapidly growing demand from higher-income consumer segments, this creates new market opportunities for other suppliers such as Botswana.

[24] This estimate of traded volumes is derived from ITC Trade Map data on which much of the data in this section of the report is based (www.trademap.org). It reflects total exports of beef (defined as meat of bovine animals), in any form. Different sources of data indicate significantly different levels of trade. It is therefore less the exact values than the order of magnitude and the relative differences that are meaningful.

Table 1: Selected data on the top 30 net exporters of beef in 2010

Rank by net exports 2010	Exporters	Value exported in 2010 (US$ '000)	Net exports in 2010 (US$ '000)	Quantity exported in 2010 (t)	Unit value (US$/unit)	Share in world exports (%)	Share in world net exports (%)
1	Australia	3,925,060	3,910,636	968,593	4,052	12.0	18.7
2	Brazil	3,861,061	3,700,332	951,255	4,059	11.8	17.7
3	India	1,696,502	1,696,502	493,926	3,435	5.2	8.1
4	Ireland	1,733,107	1,594,012	319,451	5,426	5.3	7.6
5	New Zealand	1,374,770	1,356,740	366,939	3,746	4.2	6.5
6	Uruguay	1,133,677	1,133,587	246,061	4,607	3.5	5.4
7	Argentina	1,049,015	1,044,294	154,779	6,777	3.2	5.0
8	Netherlands	2,385,896	967,145	383,177	6,227	7.3	4.6
9	Poland	983,069	931,721	275,789	3,564	3.0	4.5
10	Paraguay	880,053	880,053	211,030	4,170	2.7	4.2
11	USA	3,397,114	692,164	726,758	4,674	10.4	3.3
12	Canada	1,273,924	551,583	371,171	3,433	3.9	2.6
13	Belarus	465,577	463,885	125,437	3,711	1.4	2.2
14	Belgium	719,335	442,415	123,996	5,801	2.2	2.1
15	Nicaragua	307,669	307,314	84,133	3,657	0.9	1.5
16	Austria	474,423	277,849	104,874	4,523	1.5	1.3
17	Germany	1,935,390	225,098	403,225	4,800	5.9	1.1
18	**Botswana**	**158,373**	**158,171**	**36,312**	**4,361**	**0.5**	**0.8**
19	Lithuania	101,393	94,680	26,616	3,810	0.3	0.5
20	Namibia	72,248	69,926	11,851	6,096	0.2	0.3
21	Pakistan	65,237	61,126	25,306	2,578	0.2	0.3
22	Ukraine	45,755	38,390	13,389	3,418	0.1	0.2
23	Costa Rica	40,658	28,305	13,088	3,106	0.1	0.1
24	China	109,086	24,864	22,147	4,925	0.3	0.1
25	Serbia	18,342	17,917	3,825	4,795	0.1	0.1
26	Latvia	22,728	14,937	8,209	2,772	0.1	0.1
27	Panama	14,946	5,807	4,490	3,328	0.0	0.0
28	Hungary	53,417	3,427	16,259	3,285	0.2	0.0
29	UAE	175,887	−59,564	43,420	4,050	0.5	−0.3
30	Mexico	288,146	−586,593	72,084	3,997	0.9	−2.8
	World	**32,606,929**	**20,876,233**[25]	**7,442,615**	**4,382**	**100.0**	**100.0**

Source: Authors, derived from International Trade Centre Trade Map. Note: data refer to all beef meat fresh and frozen, boneless, bone-in cuts and carcasses.

[25] This number reflects the total net exported value for all countries with a positive net export.

Botswana is Africa's largest beef exporter (Table 1), ranked 18th in the world with a share of 0.5 percent in total world exports in value terms.[26] The table also indicates that Botswana captures a price for its beef that is comparable with the average world price but significantly lower than the average export price of its neighbouring competitor, Namibia. This price differential is maintained when we look at the trade in boneless cuts which are the main export product for Botswana (see additional data in Annex 2). Whereas Botswana sells fresh/chilled boneless cuts for US$5.6/kg on average, Namibia sells at US$6.8/kg (21 percent more). For frozen boneless cuts the difference is even starker with respective prices of US$3.4/kg and US$4.7/kg (38 percent difference). This price differential is in part due to the more-developed branding and marketing strategy of Namibia and its greater focus on direct sales to retailers in high-end markets in Europe.

With a world beef trading volume of only 14 percent of overall world production, trade and prices are easily disturbed if supply from a major exporting country drops or demand in a major importing country suddenly increases. Recent examples of such events include drought and floods in Australia, the tsunami and earthquake in Japan, increased domestic demand in Brazil, government policies to discourage export in Argentina and FMD outbreaks in South Korea.

Other factors that have a strong impact on trade are exchange rates and grain prices. Exchange rates of local currencies against the currency of the importing country determine the competitiveness of a country's beef subsector in the world market and the purchasing power of an importing country. For example, over the last two years the United States has again become a beef exporter because of the low exchange rate of the dollar, the reduction in domestic consumption resulting from people's financial constraints and shortage of supply of beef in South Korea and Japan, traditional United States beef export markets.

Grain prices, linked to fuel and fertilizer prices, shot upwards in 2007, reducing profitability of feedlotting and resulting in a reduction in the number of breeding cows in those areas where grain-feeding is the main mode of production. With grain prices having come down and demand for beef increasing again, farmers worldwide have started to rebuild their holdings of breeding cows and are again preparing for active participation in the world market for grain-fed beef. This means that there will be a period of depressed supply of slaughter stock and overcapacity in slaughtering facilities as a result of the reduced cattle inventory and high retention of heifers to rebuild the herd. In turn, this will likely lead to industry consolidation and rationalization in slaughtering and deboning in the major beef exporting countries, resulting in improved efficiency in future and reduced overhead costs and improved competitiveness. This "hog cycle" in beef production takes longer than in pork production because of the longer reproductive cycle in cattle and longer period to slaughter, but works in a similar way, usually allowing larger stakeholders with access to finance to respond to the cyclic pattern in a more adequate way.

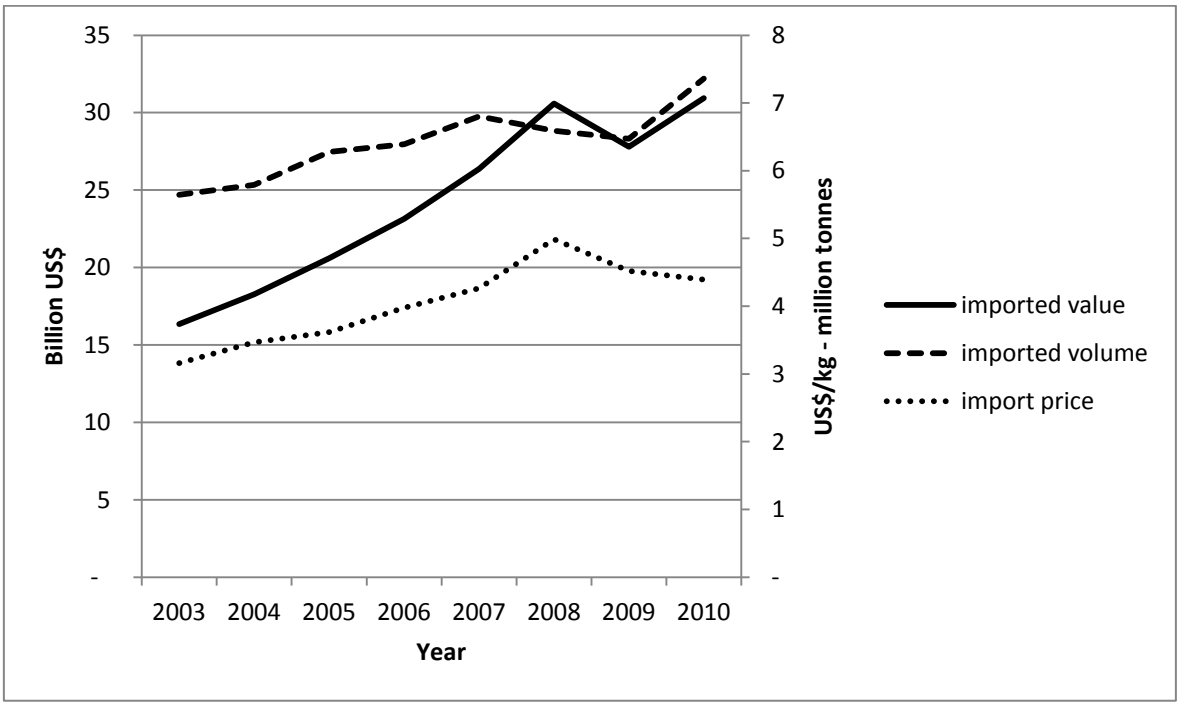
4.2.2 Key trends

In general, since 2004 overall world beef production has more-or-less matched or exceeded total consumption, which means that beef export markets are becoming increasingly competitive (DEEDI 2009). As shown in Figure 2, the 2008 global economic crisis sent a shockwave through

[26] ITC Trade Map data are in part mirror statistics, i.e. the exports of a country are estimated through the imports from this country by other countries. The export volume indicated by Trade Map for Botswana in 2010 (36,000 tonnes) is greater than the 25,000–30,000 tonnes that would be expected based on the throughput of abattoirs in 2010 reported by the BMC. While this may be attributed to carry-over stock from 2009, it may also point to some limitations in the data. It is thus not so much the exact numbers as the general orders of magnitude that are key here. Even if Botswana's export volume in 2010 was only 27,000 tonnes, it would still be ranked 18th in the list and its exports would still be about 2–3 percent of those of Brazil. Where clearly erroneous data were encountered, they were either taken out or replaced by more reliable estimates from other sources.

beef value chains around the world. Global production fell but demand dropped even faster, resulting in lower prices in 2009 and 2010. The strong recovery in import demand in 2010 overcompensated for the decreased price, resulting in a recovery of the imported value in 2010, at least in nominal terms.

Figure 2: Global beef imports, 2003–2010



Source: Authors, based on International Trade Centre Trade Map data. Reflects sum of all beef imported fresh, chilled or frozen. Import price is a weighted average.

The longer-term outlook for global beef demand is, however, positive, with a rise in beef demand of 10 million tonnes forecast over the next decade (Rabobank 2010). While growth in many developed countries will be modest (e.g. Japan, United States) or even falling (e.g. the EU), developing-country markets will be the main growth engines as a result of population growth, urbanization and increasing incomes (e.g. ASEAN countries, China, India, Middle East).

In line with differences in economic growth, demand for animal protein, including beef, is expected to grow nearly three times as fast in developing countries as in developed countries, i.e. 6.6 percent compared with 2.4 percent (FAPRI-ISU 2011). Linked to these demand trends, trade is expected to grow at an average of 4 percent until 2025 (FAPRI-ISU 2011). Net beef trade is predicted to increase by 1.5–2.0 million tonnes between 2011 and 2025 (Table 2), while (nominal) prices will increase by 10 percent on average. Other sources indicate price increases of 20–30 percent over this time period, with most of this increase taking place in the first five years, then flattening out (EC 2011c).

Table 2: Predictions of world beef trade volume by country, 2011–2025

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2023	2025
Net Exporters						(Thousand tonnes)						
Brazil	2,142	2,144	2,247	2,380	2,475	2,561	2,634	2,695	2,774	2,858	3,222	3,560
Australia	1,369	1,406	1,458	1,504	1,547	1,584	1,613	1,636	1,654	1,667	1,697	1,710
India	770	764	756	758	753	753	750	746	746	746	738	707
New Zealand	476	488	506	527	550	569	586	599	612	622	650	667
Argentina	344	318	300	286	281	282	289	302	317	338	432	517
Canada	228	187	149	123	115	105	104	116	133	148	189	214
Ukraine	29	21	15	9	12	19	24	30	33	38	61	70
Paraguay	10	18	27	33	39	45	51	57	64	71	93	109
China, Mainland	9	−11	−33	−59	−87	−120	−156	−199	−244	−287	−411	−507
South Africa	7	15	17	17	15	18	19	17	6	−6	−38	−68
Thailand	5	3	2	−1	−3	−4	−6	−8	−11	−14	−21	−27
Other America	156	183	200	211	214	219	224	225	230	234	241	242
Total net exports	**5,545**	**5,536**	**5,644**	**5,788**	**5,911**	**6,031**	**6,132**	**6,216**	**6,314**	**6,415**	**6,853**	**7,194**
Net Importers												
Russia	842	930	1,002	1,061	1,103	1,130	1,148	1,161	1,169	1,172	1,169	1,163
Japan	782	808	838	855	871	882	890	897	903	908	922	934
United States	608	360	263	260	267	311	346	356	391	424	632	654
Mexico	344	417	458	490	512	527	541	553	561	568	609	645
EU	308	318	332	346	360	368	375	381	386	391	405	413
South Korea	299	295	291	290	294	303	315	331	347	363	422	464
China, Hong Kong	218	223	227	231	235	239	243	247	251	254	264	271
Egypt	206	222	233	242	248	252	257	261	266	270	282	293
Philippines	159	171	185	199	210	218	227	237	248	258	288	310
Taiwan	122	125	130	134	138	142	146	150	154	158	168	175
Indonesia	31	15	25	33	40	45	50	56	63	70	96	136
Other Africa	209	237	254	265	270	272	276	282	284	285	317	374
Other Asia	858	874	872	854	833	812	784	746	754	756	736	814
Other Europe	29	16	6	1	0	1	3	6	8	9	12	16
Other Oceania	2	2	1	2	2	2	3	3	3	3	4	4
Correction	528	523	527	525	528	527	528	549	526	526	527	528
Total net imports	**5,545**	**5,536**	**5,644**	**5,788**	**5,911**	**6,031**	**6,132**	**6,216**	**6,314**	**6,415**	**6,853**	**7,194**
Nebraska Direct												(US$/tonne)
Fed Steer Price	2,274	2,317	2,364	2,402		2,430 2,450	2,464	2,471	2,485	2,493	2,530	2,532

Source: Authors, derived from FAPRI-ISU (2011). Volumes indicated are net trade values. The correction factor reflects discrepancies between available import and export statistics and a trade adjustment used by FAPRI.

If the trade predictions in Table 2 are roughly accurate,[27] the most relevant developments for Botswana appear to be:

[27] Trade predictions can be highly variable. For example, EU net beef import estimates from reputable sources vary from a 20 percent decrease to a 100 percent increase over the next ten years (EC 2010).

- the continued strengthening of Brazil as the leading beef exporter;
- the reduced exports from Argentina in the medium-term;
- the change in South Africa, a near and traditional market for Botswana beef, from a net exporter to a net importer in the coming ten years;
- an expected decline in the import of beef in the non-EU European countries (at least in the near future);
- a steady increasing imports into Russia, the largest single-country import volume of beef in the world, especially in the next few years;
- a solid net beef deficiency in the EU, with the most promising opportunities for high-value cuts (see the "Hilton quota", Section 4.4.1); and
- the significant growth in imports into China and Africa.

The following summaries on the current (2011) situation for key beef exporters illustrate the dynamics on the global market.

- In India, the expansion of the dairy industry will generate additional bovine animals for export slaughter, strengthening the country's competitive position as a low-cost supplier. Three other factors positively impact its marketability. The first, particularly in North Africa and the Middle East, is that the cattle are slaughtered following halal standards. The second is that the lean character of buffalo meat has several positive blending characteristics sought after by processors. The third is that India maintains two important classifications with the OIE, namely "negligible risk" for bovine spongiform encephalopathy (BSE) and "free" for rinderpest and CBPP. However, its FMD status poses issues with gaining access to some markets. Although the disease is controlled though vaccination programmes, India does not maintain an FMD status classification with the OIE.

- In Brazil, government financial support for herd rebuilding and for genetic and pasture improvements are forecast to lead to an increase in Brazil's cattle inventories, boosting slaughter-ready supplies. Some processors have developed partnerships with ranchers to increase feedlot production, enabling them to have pools of finished cattle available throughout the year so as to avoid shortfalls during the dry season when pastures are insufficient to meet the herds' feed requirements. There is little expectation that shipments to the EU will recover as supplies which meet the EU traceability programme are limited.

- In Australia, herd rebuilding has commenced in response to greatly improved pasture conditions and fodder supply compared with recent years. As a result, the country's exports will rise modestly to near record levels (1.4 million tonnes annually). However, a relatively strong Australian dollar, robust domestic demand and falling carcass weights constrain further expansion. Appreciation of the Australian dollar in 2011 has reduced shipments to the United States and made Australia somewhat less competitive in other markets such as Japan. As a result, more shipments are being sent to non-traditional markets such as Russia.

- In Argentina, although constrained by government restrictions and domestic beef prices, increased production could bolster exports, which are forecast to reach 300,000 tonnes. Consequently, the industry has focused on shipping higher-value cuts to premium markets such as the EU (under and above of the "Hilton quota," see Section 4.4.1), Russia and Israel.

- The EU is a net importer of beef but is also a major exporter. In 2010 EU exports jumped to 426,700 tonnes, twice as much as it exported in 2009. These exports were mainly to Russia and Turkey. The increase was the result of a combination of factors, such as an improving

international economic situation and a large drop in the import tariff on beef in Turkey. However, EU beef production is predicted to remain relatively stagnant at 8 million tonnes per year, hence no further increases in export to Russia and Turkey are foreseen.

The current and expected export volumes of traditional beef exporting countries such as Australia and Brazil and rapidly growing exporters such as India are important factors to take into account as Botswana plans how to structure and develop its beef-export potential. Even if Botswana were to double or triple the volume of beef it exports as a result of herd improvement and growth, improved production, processing and marketing practices, and structural change, it will remain a small player in the markets of the major importing countries relative to these large global players. Botswana will find it difficult to compete purely on price as it does not have the necessary economies of scale. Although price will always be a factor, Botswana will likely have more opportunities in differentiated, high-value niche markets, such as branded quality cuts for top-end retailers or restaurants, or in the fast-growing or newly emerging markets of smaller beef-importing countries, where it can exploit its location and/or product qualities as competitive advantages.[28]

The above indicates the importance for a beef exporting country of understanding the dynamics of the markets it is exporting to, of building up an intelligence network and of having a variety of strategic options to choose from when market conditions and terms of trade change. In many countries these responsibilities are vested in independent meat boards. Noteworthy examples include Meat and Livestock Australia (www.mla.com.au), the Meat and Livestock Board in the Netherlands (www.pve.nl), the Meat Board of Namibia (www.nammic.com.na/) and Bord Bia in Ireland (www.bordbia.ie). Such boards do not trade in meat, but gather information, work towards improving the sector's performance and promote the national product. Their financing is often organized through a levy system, with or without government support.

4.3 Botswana's beef trade patterns

4.3.1 Fresh and frozen beef

Table 3 presents an overview of Botswana's beef exports over the last decade. Frozen and chilled boneless cuts are the dominant export products, with frozen cuts typically dominating the export volumes. Exports have fluctuated, although there was a growth trend from 2002 that was interrupted by the 2008 global economic crisis but then recovered in 2009 and 2010. The jump in exports to the EU in 2007 reflected Botswana's ability (similar to Namibia's) to take advantage of a number of developments that year, which included reduced exports from Brazil (herd contraction due to reduced profitability, stricter enforcement of FMD control requirements, stricter enforcement of traceability requirements), Argentina (policies that discouraged exports) and Australia (droughts, strengthened currency) (Scoones *et al*. 2010). Clearly, circumstances influencing world beef supply can change fast, providing short-term opportunities for some.

When we compare the export situation in 2005 with that in 2010 (Table 4), it is remarkable that apart from an increase of more than 50 percent in the overall volume exported, the distribution across the various export markets remained largely the same. The largest change was in exports to South Africa; this increase was driven by the need to move the exceptionally high throughput of Botswana's abattoirs in 2010.[29] A number of new markets for Botswana's beef were developed between 2005 and 2010, but volumes shipped to them in 2010 were insignificant.

[28] This may be too much of a simplification, as lower-quality Botswana beef also needs to find markets.

[29] In South Africa, there is a perception that Botswana uses the South African market to dump beef at low prices when it cannot sell in the EU market (Whitehouse & Associates 2011). To build South Africa as a long-term market for quality beef, Botswana will have build trust on a basis of improved delivery to core customers.

Table 3: Beef exports from Botswana by product type, 2001–2010

	Beef exports (tonnes)									
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Bovine cuts boneless, fresh or chilled	7,381 (36%)	3,948	4,217	5,206	8,243	9,004	12,327	9,562	10,715	16,626 (46%)
Bovine carcasses and half carcasses, fresh or chilled	(0%)		2	34	253	115	136	44	58	1,852 (5%)
Bovine cuts bone in, fresh or chilled	0 (0%)	1	1	149			19	22	92	43 (<1%)
Bovine cuts boneless, frozen	13,047 (64%)	4,554	4,766	10,343	11,337	11,767	17,992	8,946	13,885	17,740 (49%)
Bovine cuts bone in, frozen	0 (0%)	41		37	18				24	51 (<1%)
Bovine carcasses and half carcasses, frozen	86 (<1%)		2	144	99	61	38		67	(<1%)
Total quantity exported	20,514	8,544	8,988	15,913	19,950	20,947	30,512	18,574	24,841	36,312

Source: Authors, based on International Trade Centre Trade Map data.

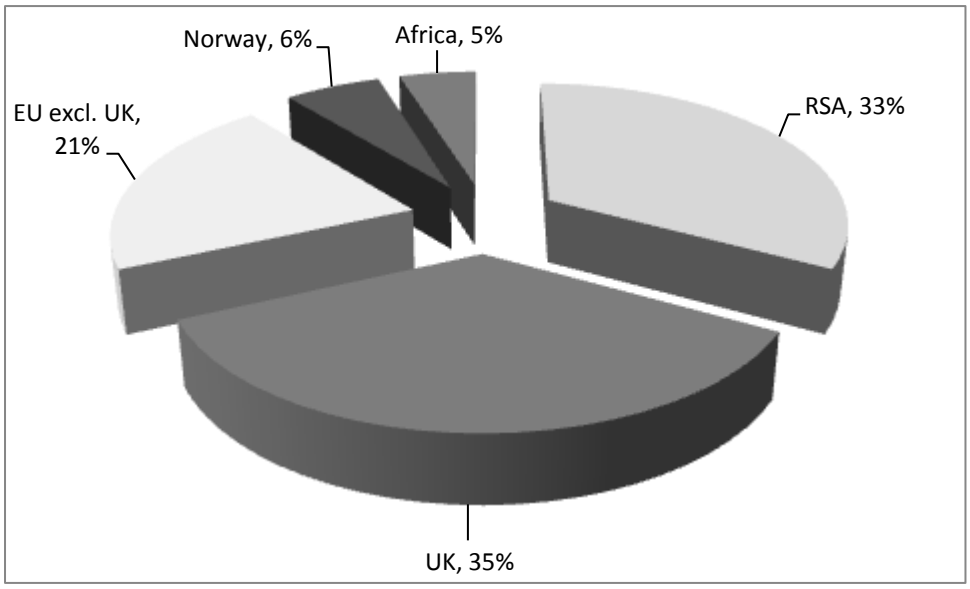
Table 4: Export of frozen and chilled bone-in and boneless beef cuts from Botswana by destination market, 2005 and 2010

	Beef exports (tonnes)					
	2005			**2010**		
	Fresh	**Frozen**	**Total**	**Fresh**	**Frozen**	**Total**
UK	3,380 (23%)	617 (4%)	3,997 (27%)	5,475 (24%)	1,223 (5%)	6,699 (29%)
Germany (EU/Norway)	930 (6%)	3,051 (21%)	3,981 (27%)	1,288 (6%)	5,567 (24%)	6,855 (30%)
BV	0 (0%)	530 (4%)	530 (4%)	0 (0%)	0 (0%)	0 (0%)
Italy	2,005 (13%)	0 (0%)	2,005 (13%)	0 (0%)	0 (0%)	0 (0%)
EU subtotal	**6,316 (42%)**	**4,198 (28%)**	**10,513 (71%)**	**6,763 (29%)**	**6,791 (29%)**	**13,553 (59%)**
RSA	337 (2%)	3,152 (21%)	3,489 (23%)	1,337 (6%)	7,668 (33%)	9,005 (39%)
Malawi	0 (0%)	0 (0%)	0 (0%)	0 (0%)	30 (<1%)	30 (<1%)
Mauritius	0 (0%)	0 (0%)	0 (0%)	0 (0%)	19 (<1%)	19 (<1%)
Zimbabwe	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (<1%)	1 (<1%)
Namibia, Zambia and Mozambique	0 (0%)	0 (0%)	0 (0%)	24 (<1%)	92 (<1%)	115 (<1%)
Reunion	665 (4%)	202 (1%)	867 (6%)	326 (1%)	0 (0%)	326 (1%)
Africa subtotal	**1,001 (7%)**	**3,354 (23%)**	**4,355 (29%)**	**1,686 (7%)**	**7,809 (34%)**	**9,496 (41%)**
Exports total	**7,317 (49%)**	**7,551 (51%)**	**14,868 (100%)**	**8,449 (37%)**	**14,600 (63%)**	**23,049 (100%)**

Source: Authors, based on BMC data.

Some of the market diversification is, however, hidden in Table 4 as exports to Germany include re-exports to other EU countries (Austria, Belgium, Cyprus, Denmark, Greece, Italy, the Netherlands) and (mostly) to Norway. According to the latest annual report available from the BMC, the processor, and thus Botswana, exported to 18 different markets (BMC 2011). Nevertheless, the vast majority of Botswana's beef exports go to the EU and South Africa (Figure 3).

Figure 3: BMC exports by country (share of value), 2010



Source: Authors, based on BMC (2011).

4.3.2 Other beef value-chain products

Raw hides

Botswana imports a small amount of bovine raw hides,[30] never more than US$300,000-worth per year since 2001 (International Trade Centre [ITC] Trade Map). It has exported around US$4 million-worth of hides annually since 2005 (with a dip in 2008/09), down from a peak of US$10 million in 2001, which included exports to Italy valued at nearly US$8 million. The exports to Italy declined between 2001 and 2006 and were partly replaced by exports to China, Hong Kong and the United Kingdom. South Africa is currently the most important export market for hides, with a share of 57 percent in 2010.

Processed beef products

Botswana's imports of processed beef[31] have been growing steadily by more than 20 percent per year in value terms since 2001, reaching a peak of just over US$3 million in 2010 (Figure 4). The volume imported grew much slower (around 4 percent per year), indicating an increase in the unit value of beef products being imported over time.

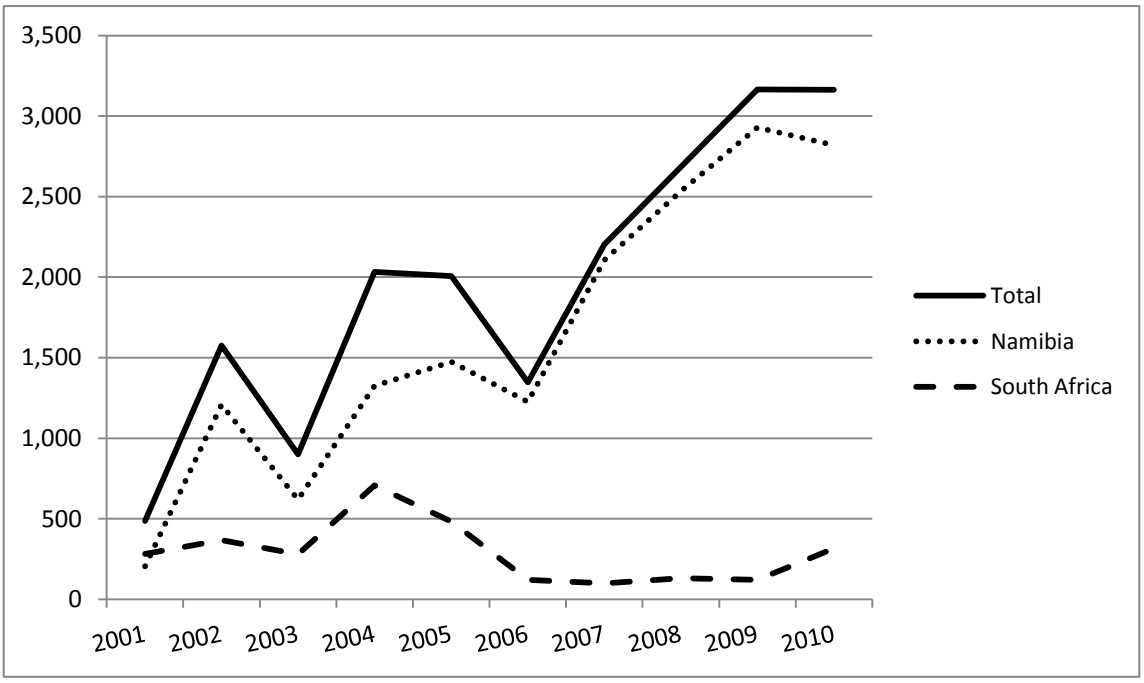
Live bovine animals

There is some trade in live bovine animals. Although live bovine animals are exported from Botswana at times, the values involved are small, mostly less than US$30,000 per year, and mostly

[30] SIC Code 4101 – Raw hides and skins of bovine/equine animals.

[31] SIC Code 160250 – Bovine meat and meat offal not elsewhere classified, excluding livers, prepared or preserved.

Figure 4: Botswana's imports of processed beef products (US$ '000)



Source: International Trade Centre Trade Map

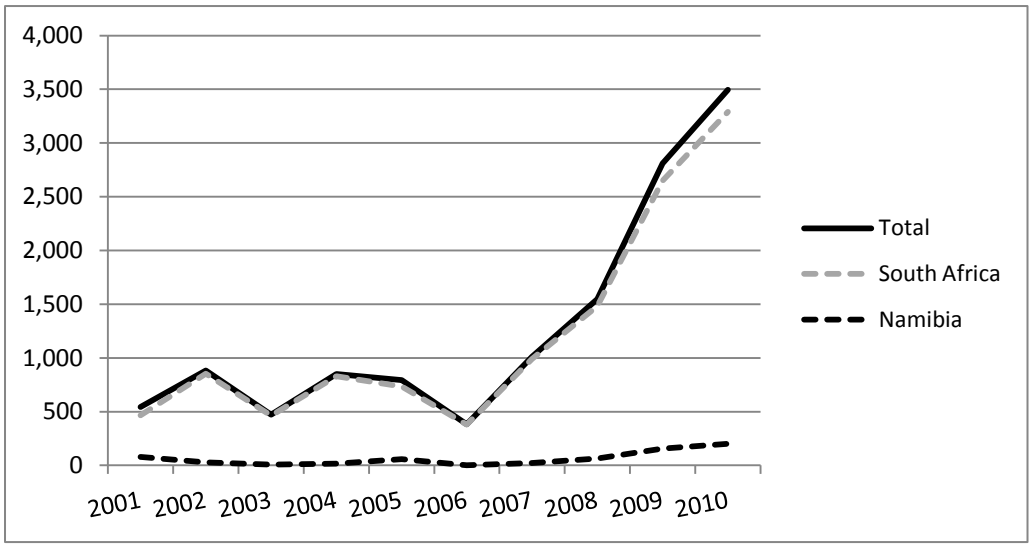
relating to the export of pedigree animals by the private sector. However, at times there are larger exports, for example to Namibia in 2005 (US$4 million) and 2006 (US$762,000), according to ITC data. In 2011, live cattle exports to Zimbabwe were negotiated as part of a decision to use slaughter rather than eradication after an FMD outbreak in the northeast of the country. The main reason for these normally low export levels is that the BMC, which holds the legal monopoly for the export of live cattle, wants to maximize the throughput of its processing plants and therefore does not want to export live animals. The BMC monopoly on live cattle exports appears to take away an important market opportunity for Batswana farmers; live exports from Namibia to South Africa account for the largest share of the income from cattle of Namibian cattle farmers (Meat Board of Namibia 2011).

Imports of live animals, mostly for breeding, also are small but are increasing, reaching a total value of US$4 million in 2010 (Figure 5). These breeding animals are overwhelmingly imported from South Africa, but Namibia's importance has grown since 2007.

4.3.3 Comparing Botswana to Namibia

Given the countries' similarities, the beef value chains in Botswana and Namibia provide an excellent opportunity for comparative analysis. Table 5 compares the beef export performance of the two countries (bearing in mind the limitations of the data). Except for the fact that Botswana is a larger exporter in value and volume terms, Namibia out-competes Botswana in most other respects. Its exports have grown faster, especially in terms of volume, it exports more higher-value fresh-chilled boneless cuts, it sells more into high-end markets, and it sells at prices that are higher across the board than those received by Botswana (on average a 22 percent difference for chilled beef, and a 37 percent difference for frozen beef).

Figure 5: Live bovine animal imports into Botswana (US$ '000)



Source: International Trade Centre Trade Map.

Table 5: A comparison between beef exports from Botswana and Namibia

	Botswana	Namibia	Difference
Value exported in 2010 (US$ '000)	153,100	72,035	81,065
Quantity exported in 2010 (t)	34,366	11,792	22,574
Growth in value, 2006–2010 (%)	41.1	43.2	−2.1
Growth in quantity, 2006–2010 (%)	27.2	49.5	−22.2
Quantity of beef exported by product type in 2010:			
- frozen boneless (%)	48.9	32.7	16.2
- fresh or chilled boneless (%)	45.8	66.8	−21.0
- fresh or chilled (half) carcasses (%)	5.1	0.0	5.1
Unit prices for fresh or chilled boneless in 2010:			
- world (US$/kg)	5.6	6.8	22%
- United Kingdom (US$/kg)	5.5	6.5	17%
- [2011] Norway (US$/kg)	13.0	17.8	37%
- [2011] Norway (US$/kg) steaks & fillets	14.0	18.0	29%
Unit prices for frozen boneless in 2010:			
- world (US$/kg)	3.4	4.7	37%
- United Kingdom (US$/kg)	3.2	3.7	16%
- [2011] Norway (US$/kg)	6,6	8.9	35%
- [2011] Norway (US$/kg) steaks & fillets[32]	8.0	12.0	50%

Source: Authors, based International Trade Centre Trade Map data.

[32] Swaziland has in the last few years increased exports to Norway and has been able to secure an average unit price of US$16 per kg for frozen steaks and fillets (ITC Trade Map data), thus outcompeting both Namibia and Botswana, and further illustrating the growth potential in the export markets.

The differences between the two countries in part reflect the major structural change in Namibia's beef value chain. Possible factors explaining Namibia's seemingly better market performance, and certainly factors worth considering in an upgrading strategy for Botswana's beef value chain, include the following interrelated elements:

- The absence of an export monopoly. This led to greater private-sector involvement in the beef value chain and resulted in competition among six exporters that are aware of and responsive to changing preferences in the export market (e.g. in terms of sustainability image).

- The presence the Meat Board of Namibia, which, through convening, market research and technical support, facilitates synergies at the value-chain level.

- The establishment of the Farm Assured Namibian Meat (FAN Meat) scheme. This is a means of marketing free-range, hormone-free beef with guaranteed veterinary and animal welfare standards (Scoones *et al*. 2010). It combines good agricultural practices (GAP), good transport practices, good veterinary practices and good manufacturing practices. GAP guarantee customers that animals will never receive more than 30 percent non-grazing supplementation, in part to maintain the grass-fed character of the animals but also to address environmental and animal welfare concerns. As a result, a larger share of the total kill is sold as "quality differentiated" Namibian beef cuts, branded and retail packaged. This enabled exporting companies to pay premiums of 183 million Namibian dollars (US$28 million)[33] per year above the prices received by comparable South African farmers.

- The sustainability image of Namibian beef. This is further strengthened by the Meatco Foundation, which supports farmers in communal areas with, for example, provision of water for cattle. Part of its limited funds (US$100,000 in 2011) comes from distribution partners (the Co-op chain in Denmark).

- The new marketing strategy of Meatco, Namibia's largest beef processor. This represents a shift from selling beef in wholesale commodity markets to selling directly to the final retailer or food-service provider in the end market (e.g. cash-and-carry operations, restaurants). The share of sales to such end-users in Meatco's international sales increased from around 20 percent in 2008 to around 40 percent in 2010 and is forecast to increase further to around 80 percent by 2012 (Figure 6).

- Linked to this new strategy is the development of Meatco's "Nature's Reserve" brand, launched in September 2008. This allows quality-conscious consumers to distinguish Namibian beef from other supplies. Associated with this are investments in new packing equipment (such as for vacuum-packing portioned meat) to ensure customer satisfaction and strengthen the promotion strategy. Also associated with this is a focus on high-end markets such as Woolworths (South Africa), ASDA (United Kingdom), the Co-op (Denmark and Sweden) and Norsk Polar (Norway).

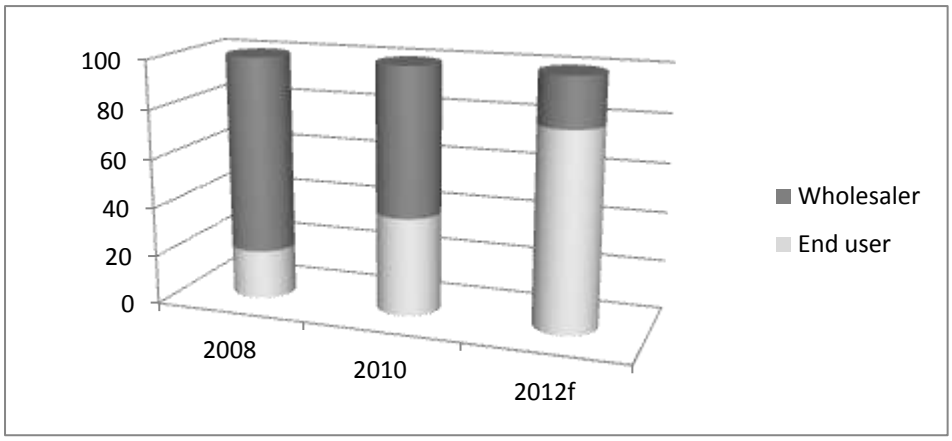
4.4 Markets outside sub-Saharan Africa

4.4.1 European Union market

There still appear to be good opportunities to market to the EU, although competition in the high-quality segment of the EU beef market seems to be getting stiffer (see "Hilton quota," below). The EU market has high entry requirements, including: prohibition of the use of growth hormones and animal-based feed; vaccination records for each animal slaughtered; FMD-free status at the OIE;

[33] Based on a US$:Namibian dollar ratio of 1:6.56 (oanda.com – 31/12/2010).

Figure 6: Namibia's Meatco's shifting customer profile



Source: Meat Board of Namibia 2011

Picture 10: Meatco products in Europe

Source: Meat Board of Namiba

and presence of a sophisticated traceability system. Compliance with these requirements is costly, which seems to point to high opportunity costs given that many alternate markets do not impose similar conditions. However, the overall trend for beef markets, especially those demanding high quality, is to move toward the same strict standards demanded in the EU market.

Beef production in the EU, mostly based on culling from the dairy industry and on specialized veal production, has decreased over time because of increasing input costs and cuts in subsidies and facilities such as export restitution.[34] The reduction in animal numbers will be partly compensated by increased productivity through higher slaughter weight and increased fertility, which is a continuing phenomenon. Net imports of beef and veal into the EU are expected to increase steadily from 300,000 tonnes in 2011 to almost 400,000 tonnes in 2020 (Table 6).

Table 7 presents a country-level overview of the EU's imports of Botswana's main beef export product, boneless beef cuts, frozen and fresh/chilled. While all EU countries import beef, the United Kingdom, Germany, France, the Netherlands, and Italy are the largest importers. Import prices for boneless beef cuts are high in relative terms, with an average value of US$11.9/kg. The higher prices in Austria, Germany, Italy and Spain are in part explained by the greater share of veal in the imports into these countries relative to other EU countries.

Although some of the beef imported into the EU ends up on supermarket shelves (Scoones *et al*. 2010), much of the beef from southern countries goes into food services or processing. Either way, in order to guarantee safe beef products to their consumers, and to differentiate their ability to do so from their competitors, these supermarket chains, food service providers and meat processors

[34] Export restitution is an EU term for variable export subsidies given to traders to cover the difference between the higher internal Common Agricultural Policy price of a commodity and its lower world price.

Table 6: Forecast net trade in beef and veal, Europe, 2011–2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
					Million head					
Cattle inventories	88	87	86	86	86	85	85	85	85	85
					Thousand tonnes					
Production	7,820	7,762	7,726	7,705	7,697	7,698	7,696	7,694	7,692	7,691
Consumption	8,128	8,080	8,058	8,050	8,057	8,066	8,071	8,075	8,078	8,082
Net trade	−308	−318	−332	−346	−360	−368	−375	−381	−386	−391

Source: FAPRI-ISU (2011).

Table 7: Selected data on the import of boneless beef cuts by EU countries, 2010

Rank by vol.	Importer	Value imported in 2010 (US$ '000)	Quantity imported in 2010 (t)	Unit value (US$/t)	Quantity fresh or chilled imported (%)	Quantity frozen imported (%)	Growth in value 2006–2010 (%)	Growth in quantity 2006–2010 (%)
	World	**23,861,429**	**5,685,838**	**9,183**	**33.7**	**66.3**	**16.8**	**−2.7**
	EU 27	**7,199,221**	**1,137,597**	**11,880**	**63.9**	**36.1**		
1	UK	968,148	188,245	9,462	65.5	34.5	−5.6	−8.5
2	France	1,004,414	178,870	10,516	64.8	35.2	21.9	13.3
3	Germany	1,226,075	146,617	14,680	69.9	30.1	22.6	4.4
4	Netherlands	696,837	115,301	11,387	64.0	36.0	9.0	−21.3
5	Italy	874,270	103,378	16,182	64.5	35.5	15.9	−10.0
6	Denmark	456,552	70,693	12,049	83.2	16.8	41.9	31.7
7	Spain	472,176	66,803	13,153	70.0	30.0	−28.1	−13.0
8	Sweden	342,149	65,951	10,295	52.5	47.5	8.8	−0.9
9	Belgium	205,567	33,914	11,513	61.0	39.0	21.4	25.0
10	Portugal	229,329	31,727	14,260	57.9	42.1	14.0	0.9
11	Greece	135,863	25,357	10,644	51.5	48.5	16.4	−18.3
12	Ireland	87,931	18,918	9,169	58.4	41.6	13.7	3.9
13	Czech Rep.	72,438	13,927	10,171	80.6	19.4	39.9	45.1
14	Austria	112,916	11,861	16,945	70.2	29.8	25.5	14.0
15	Bulgaria	29,994	9,858	5,838	9.3	90.7	−45.8	−408.3
16	Poland	38,213	9,847	7,824	47.8	52.2	67.5	65.5
17	Romania	33,609	9,610	9,716	5.8	94.2	−28.3	−193.5
18	Finland	61,991	9,146	13,304	53.4	46.6	8.9	0.2
19	Hungary	35,846	8,497	8,463	44.8	55.2	39.6	11.4
20	Malta	23,391	3,619	17,593	5.2	94.8	52.5	−27.2
21	Luxembourg	30,566	3,269	15,774	67.9	32.1	5.5	16.5
22	Slovenia	17,159	3,218	10,549	57.2	42.8	60.0	58.7
23	Estonia	9,095	2,539	7,819	15.9	84.1	29.5	−37.6
24	Cyprus	13,439	1,941	28,726	2.8	97.2	52.4	24.6
25	Slovakia	10,060	1,709	11,540	54.4	45.6	45.3	−40.1
26	Latvia	6,384	1,469	9,290	34.1	65.9	24.2	−7.8
27	Lithuania	4,391	1,271	7,864	19.7	80.3	32.2	−22.3

Source: Authors, based on BMC data.

demand compliance not only with industry-wide standards such as hazard analysis and critical control points (HACCP) and the GlobalGAP farm assurance scheme 19, but also with their own private standards (linked to labels such as Marks and Spencer's "Field to Fork" or Tesco's "Nature's Choice").

Whether in supermarkets or restaurants, EU consumers are unlikely to include FMD risk or the fate of African pastoralists in their decision process, or if they do it would influence their decision at the margin only. These consumers care about value as derived from the beef's quality, taste and price. They also care, and increasingly so, about the process by which the beef product was produced. For example, organic beef or natural-rangeland beef are products that valued by the consumer as they are associated with a healthy lifestyle.[35]

These supermarket-driven standards relate to the entire beef value chain and push it toward greater vertical coordination, even vertical integration. Compliance increases producers' costs, while competition and asymmetric market power balances exercise a downward pressure on producer prices. This reduction in margins in turn requires increasing volumes to maintain profitability. Smallholder producers, who step in and out of the market depending on personal cash needs or abilities, do not fit well in this demanding and highly controlled supply-chain model and will increasingly be excluded from it. Beyond pure product quality and safety guarantees, these standards seek to differentiate based on traceability, organic/natural and socially responsible production, animal welfare and environmental credentials. Furthermore, these standards (public as well as private) are constantly evolving, typically getting more complex, which in turn forces suppliers to the EU market to continuously track them closely, a costly endeavour.

EU import regimes

There are seven different import regimes in the EU market (more detail in Annex 2):

1. The (Interim) Economic Partnership Agreement system for African, Caribbean and Pacific (ACP) Countries

   Under this system, which for beef applies in practice only to Botswana and Namibia, imports of deboned beef are quota and tariff free. This agreement is under threat for Botswana; a recent EC report (EC 2011a) stated that "[...] Botswana [and other countries] have signed but have not taken the necessary steps towards ratification of their respective Agreements. Therefore, these countries no longer meet the conditions of the Market Access Regulation for advance provisional application of trade preferences which were extended to them as of 1 January 2008 in anticipation of the steps towards ratification of an Economic Partnership Agreement (EPA). According to the criteria […] trade preferences granted to these countries should no longer be maintained." The same document, however, also states that: "Should the countries removed from Annex I take the necessary steps towards ratification of an EPA, they would continue to benefit from the respective trade preferences and could therefore be re-instated in the Annex as soon as possible in order to provide continuity of their market access". If Botswana loses its preferential access to the EU, it would as an upper-middle income country shift to the "most favoured nation" regime (duties paid as per the general tariff schedule) and as such would lose (by 2014?) its preferential access value which was estimated at €29 million a year (US$40 million).

[35] "Natural" refers to various product characteristics that Botswana could develop more for its beef products: organic, grass-fed, hormone-free, environmentally friendly, supportive of pastoralists and so on.

2. High-quality beef import-levy-free quota ("grain-fed beef") for non-ACP countries

   Council Regulation 617/2009 opened an autonomous tariff quota for high-quality beef (HQB) and Commission Regulation 620/2009 provides for the administration of the HQB quota for high-quality deboned chilled or frozen beef. This quota, nicknamed the "Hilton quota," is the answer of the EU to disputes between the United States and the EU about the use of hormone growth promoters (HGPs) and created as a compromise to appease the United States, whose beef is largely excluded from the EU market. It is open to Argentina, Australia, Brazil, Canada, New Zealand, Paraguay, the United States and Uruguay. There is no import levy on imports under this quota, but each country has to apply for a quota through its beef-importing companies. This quota started in 2009 with 20,000 tonnes and was in January 2012 increased to 48,200 tonnes by the EC Commission for International Trade. As with all beef imports to the EU, countries have to give guarantees for freedom of HGPs and other substances, from disease etc. This quota system allows eligible countries to export beef to the EU under the same conditions as Botswana and Namibia, the only difference being that the total amount is capped by a quota. These countries have now all built up the necessary quality and safety-assurance systems to comply with the EU requirements. The system is now severely oversubscribed and in jeopardy. Quota rights were in 2011 traded at €0.40–0.70/kg, depressing the price importers are willing to pay for the imported beef.

3. Tariff HQB quota ("grass-fed beef")

   Tariff HQB quotas are country-specific and are subject to EU inspections and certification, as well as a 20 percent import duty. The total imports under this regime cannot exceed 62,500 tonnes. With Japan imposing a 38.5 percent import quota, this market is interesting for Australia and New Zealand. South American producers are, however, nearer to the European market and have lower transport costs.

4. General Agreement on Tariffs and Trade (GATT) frozen beef and veal quota[36]

   Beef products entering under this quota (53,000 tonnes) incur a 20 percent *ad valorem* customs duty, but no specific import duty. The quota is operated annually and the main difference between this quota and the tariff HQB quota is that it is open only to frozen boneless product. Also, the quota is distributed among member state importers/operators, with provisions to accommodate new entrants.

5. Import tariff quota for frozen beef for processing

   This annual quota covers the manufacturing sector and is often referred to the System A/B or manufacturing beef quota. It totals 63,703 tonnes of either frozen bone-in forequarters or frozen boneless cuts, thick or thin skirt. It can be used in two types of processed beef products as defined by EC Regulation (EC) No. 412/2008 – 50,000 tonnes for A products and 13,703 tonnes for B products. The scheme operates on an application system with a 20 percent duty rate for System A and a 20 percent reduced base specific duty for System B. An application security fee of €6/100 kg and licence security fee of €12/100 kg are also applicable.

6. Frozen thin skirt quota

   A quota of 1,500 tonnes may be imported free of specific import customs duty, but a 4 percent *ad valorem* customs duty applies. Of the 1,500 tonnes, 700 tonnes are reserved for Argentina and 800 tonnes for other non-EU countries.

[36] Information for the types of imports from http://www.mla.com.au/Prices-and-markets/Overseas-markets/Europe/Beef

7. Normal import regime

   Outside the above six special import regimes, the normal import tariff applies. This differs by product but basically includes an import duty of 12.8 percent of the cost, insurance and freight (CIF) value and a specific import customs duty of €1,768/tonne. Annex 2 provides more detail.

Sources of EU beef imports

The main exporters of beef to the EU, i.e. Botswana's main competition in its main target export market, are Brazil, Argentina, Uruguay, Australia, New Zealand, Namibia, and the United States, in that order (Table 8). Between 2006 and 2009 Brazil struggled to meet the EU SPS requirement and as a result its exports to the EU fell by more than half (even though its global exports increased rapidly increasing over the same period). All the other exporting countries benefited from this, but especially New Zealand and Uruguay which basically doubled their beef exports to the EU. The sudden emergence of the United States from almost zero to a volume comparable to that of Botswana in just three years illustrates the impact of the Hilton quota.

Table 8: Sources of EU imports of beef and live cattle, 2006–2009

	2006		2007		2008		2009	
	(t)	(%)	(t)	(%)	(t)	(%)	(t)	(%)
Extra-EU	513,160		556,024		385,063		431,182	
Brazil	331,762	65.7	363,939	65.4	171,454	43.4	149,007	34.6
Argentina	82,865	16.1	97,656	17.6	92,924	23.5	122,494	28.4
Uruguay	45,350	8.8	39,544	16.8	66,402	16.8	79,144	18.4
Australia	12,366	2.4	10,019	1.8	12,957	3.3	16,937	3.9
Namibia	8,063	1.6	10,467	1.9	10,348	2.6	12,457	2.9
New Zealand	7,195	1.4	5,756	1	12,455	3.2	15,783	3.7
Botswana	**7,118**	**1.4**	**13,929**	**2.6**	**10,395**	**2.6**	**11,452**	**2.7**
USA	956	0.2	2,746	0.5	6,547	1.7	9,609	2.2

Source: AgriTrade (2011).

In essence, Botswana is facing increasingly stiffer competition in what used to be an export market with preferential treatment for a few countries. Although under its IEPA Botswana has been granted duty-free and quota-free access to the EU, the Hilton quota offers similar access conditions. A quota of 300,000 tonnes of mixed meat to be granted to the member countries of South America's Mercado Común del Sur (MERCOSUR) is under negotiation, to the great concern of European meat producers. Since the reform of the Common Agricultural Policy in 1999, EU beef prices have fallen by more than 25 percent. This means that the price competition on the EU market is increasing from both locally produced and imported beef.

Within this complex set of factors, four factors will determine whether a country is able to maintain or increase its exports to the EU: production cost, safety and quality, supply specifications (e.g. volume, timing, portion size) and product distinction/branding. To date, Botswana beef has never been branded as such on the EU market and has not been portioned into smaller cuts. These are areas that Botswana will need to address if it is to maintain its levels of exports to the EU.

4.4.2 Other markets outside of Africa

Beef markets other than the EU and sub-Saharan African markets that Botswana could realistically target fall in two key clusters: (1) non-EU markets in Europe (most notably Russia); and (2) markets in North Africa and the Middle East. The second cluster in particular offers some interesting market opportunities as, driven by growing populations and incomes, Algeria, Egypt, Iran, Israel, Jordan, Kuwait, Saudi Arabia and the United Arab Emirates (UAE) are all forecast to increase imports of beef by 4 percent to 9 percent in 2012 (USDA/FAS 2011).

North, Central and South America and Oceania can be safely excluded as export markets since they are themselves major producers and exporters of beef. The ability of Botswana to compete on the rapidly growing Asian beef markets is also questionable, given the solid position of big exporters such as Australia and the United States on key high-end markets such as South Korea and Japan, and India at the lower-quality end of the market. Nevertheless, it may be advisable for Botswana to keep an eye on the Chinese market, especially for HQB products, because of China's vast potential and likely rapid growth in beef imports over the next decade.[37]

The most interesting markets for Botswana are Russia, Switzerland and Norway in Europe (Table 9) and Egypt, Iran, Israel, the UAE, Iraq, Qatar and Bahrain in the Middle East (Table 10). Turkey, which is not in Table 10 as its imports are nearly all bone-in cuts, is an additional market to consider as it drastically lowered the threshold for entry into its beef market in 2010. Some characteristics of the most promising of these markets are described in the following sections.

Table 9: Trade data for importers of boneless bovine cuts in non-EU Europe

Importer	Value imported in 2010 (US$ '000)	Quantity imported in 2010 (t)	Quantity fresh or chilled imported (%)	Unit value fresh or chilled imported in 2010 (US$/t)	Quantity frozen imported (%)	Unit value frozen imported in 2010 (US$/t)
World	23,861,429	5,685,838	33.7	5,800	66.3	3,383
Russian Federation	2,107,660	605,759	3.0	5,074	97.0	3,431
Switzerland	125,404	8,909	84.6	15,177	15.4	8,039
Norway	42,331	4,987	15.5	12,105	84.5	7,823
Bosnia-Herzegovina	11,689	3,687	0.0	6,000	100.0	3,170
Ukraine	7,358	3,680	1.4	4,314	98.6	1,967
Croatia	12,684	3,101	0.5	7,000	99.5	4,076
Macedonia	7,349	2,386	7.6	3,989	92.4	3,005
Albania	3,896	1,782	*	*	100.0	2,186

* No Data found for bovine cuts boneless, fresh or chilled.
Source: Authors, based on International Trade Centre Trade Map data.

Russia

Russia's import market for beef is one of the largest in the world. In 2010, it imported over 600,000 tonnes of mostly (97 percent) frozen boneless beef cuts. It was for a long time supplied with

[37] Namibia is working on a bilateral trade agreement which includes beef exports to China (Heita 2011).

export-restitution intervention beef from the EU. Since this practice has stopped, other suppliers can now enter this market. South American beef exporters have largely cornered the market, but the EU is also still exporting beef to Russia. Australia and New Zealand are less competitive on this market because of their higher transport costs.

Table 10: Trade data for importers of boneless beef cuts in North Africa and the Middle East

Importer	Value imported in 2010 (US$ '000)	Quantity imported in 2010 (t)	Quantity fresh or chilled imported (%)	Unit value fresh or chilled imported in 2010 (US$/t)	Quantity frozen imported (%)	Unit value frozen imported in 2010 (US$/t)
World	**23,861,429**	**5,685,838**	**33.7**	**5,800**	**66.3**	**3,383**
Egypt	696,261	287,059	17.6	3,590	82.4	2,940
Iran	767,554	184,858	0.2	6,063	99.8	4,149
Saudi Arabia	298,831	91,483	11.2	4,985	88.8	3,050
Israel	359,745	70,953	*	*	100.0	5,070
UAE	196,880	44,263	24.8	6,398	75.2	3,805
Kuwait	143,214	37,918	12.5	5,176	87.5	3,578
Lebanon	163,127	34,120	66.8	5,517	33.2	3,302
Jordan	112,294	33,804	35.0	4,190	65.0	2,854
Iraq	80,791	23,971	2.5	7,040	97.5	3,275
Syria	39,715	11,303	6.9	4,698	93.1	3,426
Oman	23,105	8,494	5.3	4,936	94.7	2,596
Qatar	38,639	8,220	32.0	5,599	68.0	4,278
Bahrain	22,248	5,247	13.8	8,551	86.2	3,550
Yemen	6,251	1,856	0.1	4,000	99.9	3,367
Algeria	158,865	54,799	5.0	4,526	95.0	2,813
Libya	61,028	17,121	0.1	2,882	99.9	3,565
Tunisia	14,135	3,206	*	*	100.0	4,409
Morocco	6,769	1,579	*	*	100.0	4,287

* No data found.
Source: Authors, based on International Trade Centre Trade Map data.

Russia has long tried to increase its domestic beef production but was hampered by inefficiencies in its beef value chains. The scale of production and processing no longer match, given that most animals are now in the hands of smallholders, who only come to the market when they require cash. The dairy herd is also shrinking as that industry is restructuring. With sharply reduced livestock numbers and a feed base that diminished after the collapse of the Soviet Union as a result of shortages of sunflower and cottonseed cake, beef production has become a seasonal activity: animals ready for slaughter are harvested in autumn; during the rest of the year only poor-quality animals are slaughtered. Attempts have been made to reinstate feedlots, but the supply systems for animals and for fodder and feed are missing. Although Russia's beef imports were down 40 percent in 2009 as a result of the global economic crisis, they increased by 20 percent in 2010. The forecast is for imports to increase again in the next few years to level off at around 1.17 million tonnes (Table 11). The best market opportunities seem to be for high-quality deboned beef in the urban centres of Saint Petersburg and Moscow.

Table 11: Forecast net trade in beef, Russia, 2011–2020

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
					Million head					
Cattle herd	16.9	15.9	15.1	14.5	13.9	13.6	13.2	13.0	12.8	12.6
					Thousand tonnes					
Production	1,334	1,249	1,181	1,122	1,076	1,044	1,020	1,000	985	974
Consumption	2,176	2,180	2,183	2,183	2,180	2,174	2,168	2,162	2,154	2,146
Net trade	−842	−930	−1,002	−1,061	−1,103	−1,130	−1,148	−1,161	−1,169	−1,172

Source: FAPRI-ISU (2011).

Russia aims to protect its domestic production through a tariff rate quota system. Table 12 gives an overview of past and expected quotas for imports of beef into Russia. However, these quotas have historically been systematically exceeded. Russia sets high standards of inspection, and at times goes beyond the EU SPS standards with their national standards (GOST). Russia restricted imports from certain Brazilian beef facilities in June 2011, and alternative suppliers are expected to benefit from the continued restrictions. One such supplier could be Belarus, which under a trade agreement with Russia is allowed to export 130,000 tonnes of beef to Russia, although, with border controls between the two countries removed in July 2011, actual trade flows may be even higher.

Table 12: Beef import quotas set by Russia, 2008–2012

	Country	2008	2009	2010	2011	2012
Frozen	EU	351,600	355,600	60,000	60,000	60,000
	US	17,900	18,500	21,700	21,700	21,700
	Paraguay	3,000	3,000	–	–	–
	Other	70,400	73,000	448,300	448,300	448,300
	Total frozen	435,000	450,100	530,000	530,000	530,000
Chilled	EU	28,400	29,000	29,000	29,000	29,000
	Other	500	500	1,000	1,000	1,000
	Total chilled	28,900	29,500	30,000	30,000	30,000

Source: www.mla.com.au/Prices-and-markets/Overseas-markets/Russia.

UAE[38]

The market for (halal) beef in the UAE can be divided in three segments.

The first segment consists of markets for live animals. These have well-equipped and well-designed slaughterhouses in the major urban centres. Only few cattle are slaughtered here, the majority of animals slaughtered being lambs and kids.

The second segment is stalls in town markets. These mainly store imported goat, sheep and cattle carcasses in cool displays and prepare meat on the spot according to customer request. Bone-in beef retailed at 18 dirhams (AED)/kg or US$4.9/kg (source country not known), while fillet from

[38] This section is largely based on rapid appraisal fieldwork in Abu Dhabi and Dubai undertaken in the context of this study.

Pakistan was sold as cuts at AED35/kg and local filet sold at AED40/kg (US$9.5/kg and US$10.9/kg, respectively). Pakistanis and Indians appeared to run most of these meat enterprises, which may explain the predominance of meat from the South-Asian subcontinent.

The third segment, and the most interesting one from Botswana's perspective, is the supermarkets. This market appears to be the largest of the three. All meat is sold in portions (shoulder, leg, rack etc.), cuts or ready-to-cook packages. In the Lulu supermarket displays, portions of meat seem to be primarily from Australia and New Zealand, while ready-to-cook products come primarily from Brazil. Some of the retail prices observed in June 2011 include AED24/kg (US$6.5/kg) for beefsteak from India; AED60/kg (US$16.3/kg) for deboned veal from Holland (van Drie group), and AED40/kg (US$10.9/kg) for bone in veal; and AED40/kg (US$10.9/kg) for veal from Australia. With the highly heterogeneous population in the UAE, including a large proportion of expatriates, there appears to be a pay-off to having meat of different qualities and origins that caters to the diversity of customer preferences. Any operation exporting meat to the UAE market has to have a health certificate for the slaughterhouse that it exports from, as well as a halal certificate issued by an accredited Islamic body; the UAE authorities publish lists of such bodies.

Turkey[39]

There have been several major changes in the Turkish meat market during the last decade. The once-monopolistic parastatal Meat and Fish Agency (EBK) was privatized in 1995. In 2000, the government again took over part of the EBK to increase its control over the meat subsector for political reasons. Subsidies to the livestock sector were removed, in line with World Trade Organization (WTO) regulations, with an exception for the development of a small number of medium to large-scale fattening holdings, which was the subject of a government decree on livestock support in 2000. Argentinean companies played an important role in these developments through supply of breeding stock and direct investments in slaughter and processing facilities (parallel to direct exports of red meat to Turkey).

The Turkish domestic livestock sector comprises around three million smallholders, two-thirds of whom combine livestock with crop production. In most of these systems the animals are dual purpose and meat accounts for 40–50 percent of the total value of livestock production. This makes it difficult to quickly increase overall beef production. The livestock sector also faces a number of other constraints, including: shortage of land for forage production; lack of infrastructure; poor mechanization; and lack of credit. Thus, it can be assumed that, just as in the case of Russia, domestic beef production will not be able to keep pace with increases in demand driven by population growth and the growing affluence of the urban population in particular.

Like Russia, Turkey has been an important market destination for EU beef exporters, especially when export restitution was operating. The Turkish beef sector has always been protected by strict border measures, not only to guarantee product safety but also to control the trade and its prices. The meat sector in Turkey is still fairly closed, with a heavy government involvement in the sector. In August 2010, the Turkish government lowered the import tax from 225 percent to 30 percent. The Irish Bord Bia, long active in beef export to the Middle East (Egypt, Libya, Saudi Arabia and UAE, in particular), estimates that Turkey has an annual import potential of 150,000 tonnes of beef, but in 2010 a total of only 80,000 tonnes of beef was imported.

An Argentinean company exporting beef to Turkey has reported import prices of US$4,900/tonne for carcasses and US$6,500/tonne for deboned cuts and red meat prices in Turkey of around US$9/kg.[40] The Turkish government aims to reduce the consumer price by admitting more meat

[39] Information on the Turkish market is in part based on the authors' contacts in the meat trade.

[40] http://www.hurriyetdailynews.com/n.php?n=argentinean-firm-eye-turkish-meat-market-2011-01-20

imports and promoting domestic cattle production and feedlotting. As is the case for almost all markets in North Africa and the Middle East, the Turkish market requires halal certificates.

Iran

Iran, a huge and high-price market, is short of beef for its expanding and increasingly affluent population. Importing beef into Iran may be difficult because of the international sanctions against the country. These sanctions make Australian and South American exporters, in particular, hesitant, and this may create a market opportunity for other exporters. Imports into Iran are estimated at 235,000 tonnes and growing at 4 percent per annum (USDA/FAS 2011), but there are no reliable statistics available. There is anecdotal evidence that Kazakhstan and Kyrgyzstan are exporting beef to Iran. Iranian operators have hired slaughterhouses, set up a network of purchasing agents, have their own mullahs for the halal certification and inspection and organize air shipment to Iran. Exporting beef to Iran probably implies allowing Iranian operations to build up the meat value chain within the exporting country from farm production to export to control its halal status. This is the case for Brazil. Iranian investment in Brazilian slaughterhouses assures continued strong bilateral trade (USDA/FAS 2011). Information from key informants in Teheran indicated meat import prices of US$8/kg bone-in and US$14/kg deboned and retail prices of US$ 20/kg bone-in and US$28/kg or more for deboned beef.

4.5 Sub-Saharan African markets

4.5.1 South Africa

South Africa has a diversified and well-developed commercial beef value chain that mostly focuses on its domestic market and markets in the region. Over the last 12 years, beef consumption in South Africa has risen by an average of 1.8 percent per year and it is expected that consumption will continue to grow steadily by 1 percent or less over the next decade.

The South African beef subsector has never been able to provide enough beef to meet demand in the industrial areas of the Rand and the coastal urban areas, and has historically always relied on beef imports from the region (Botswana, Namibia and Zimbabwe). South Africa is expected to become a net importer by 2020 (Table 13).

Table 13: Forecast net trade in beef, South Africa, 2011–2025

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2023	2025
						Million head						
Cattle inventory	14.3	14.5	14.9	15.2	15.6	15.8	16.1	16.2	16.3	16.4	16.6	16.6
						Thousand tonnes						
Production	703	723	740	757	772	788	802	815	827	840	877	899
Consumption	696	708	723	740	757	769	783	798	822	845	914	967
Net trade	**7**	**15**	**17**	**17**	**15**	**18**	**19**	**17**	**6**	**−6**	**−38**	**−68**

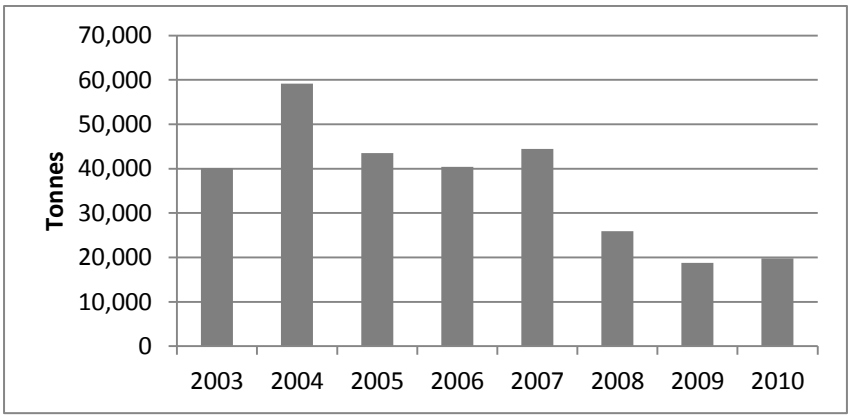
Source: FAPRI-ISU (2011).

South Africa also has a history of importing from the EU. In September 1993, the South African government had to lift restrictions on the quantity of beef that could be imported to comply with its obligations under the 1993 GATT Uruguay Round Agreement on Agriculture. This coincided with the period when the EU was facing severe criticism about its beef dumping in West Africa, which severely affected livestock owners in the Sahel, and was looking for alternative markets on which

to sell its intervention beef. Intervention beef was being sold for export at less than half the production cost and imports from the EU jumped from 6,600 tonnes in 1993 to 46,000 tonnes in 1997. This severely reduced Namibian and Botswana exports to South Africa, which were based on cheap cuts of lower-quality beef for processing. Following a public outcry, the EU removed its export restitution on beef for the South African market. Imports of South American and Australian beef increased in response.

South Africa imported approximately 20,000 tonnes of frozen beef in 2010 at an estimated value of US$56 million (ITC Trade Map mirror data). Quantities of beef imported declined between 2004 and 2009 (Figure 7). The main suppliers between 2003 and 2010 were Botswana and Namibia, and to a lesser degree various South American countries (mainly Paraguay and Uruguay taking over from Brazil since 2006) and Australia.

Figure 7: Imports of frozen beef into South Africa, 2003–2010



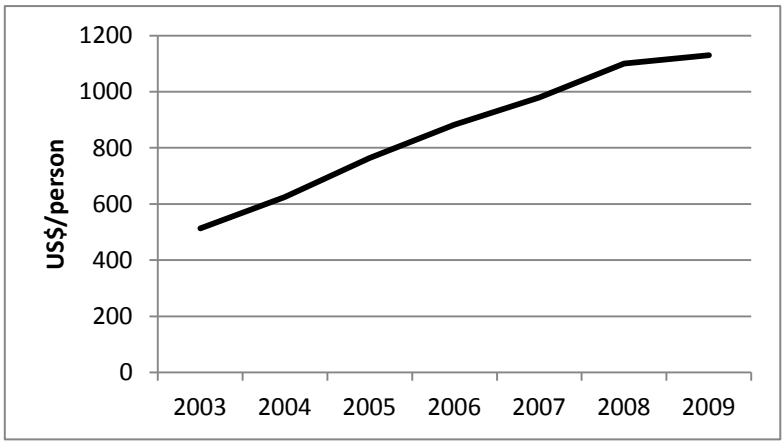
Source: Authors, based on International Trade Centre Trade Map mirror data.

4.5.2 Other sub-Saharan African markets

As indicated in Section 4.2, African beef markets are growing and represent increasingly interesting marketing opportunities for Botswana. This growth is largely driven by the rapid increase in the gross national income per capita in sub-Saharan Africa (Figure 8). This overall growth hides even stronger growth in particular markets, such as Zambia (16 percent per year), Ghana (20 percent), Nigeria (20 percent) and Angola (31 percent). As income increases, consumers tend to buy higher-value food products (such as high-quality beef). From this perspective, it is interesting to observe that there is a lack of top-end cuts of meat in most countries in sub-Saharan Africa, with the exception of Namibia, South Africa and Swaziland (and of course Botswana), for the simple reason that the type of animals producing such quality are not present in most sub-Saharan African countries. A growing niche market for branded top-end cuts for exclusive supermarkets and the hotel trade is a clear market opportunity.[41] It must be noted that this would initially involve limited quantities of meat and significant market development investments.

[41] United States beef exporters are already aggressively developing these markets (Meat Trade News Daily 2012).

Figure 8: Gross national income in sub-Saharan Africa, 2003–2009



Source: World Bank (2011). Note: Atlas Method, current US$.

Some of this unmet demand is being met through imports of lower-quality, lower-priced beef from major beef exporters in Europe, India, South America and elsewhere, but African beef processors have started to develop regional strategies to take advantage of these opportunities. For example, Zambeef,[42] a vertically integrated beef processor from Zambia, expanded its Master Meats brand to Nigeria in 2009 in a partnership with South Africa's supermarket chain, Shoprite (Connors 2011). Zambeef had been supplying Shoprite's stores in South Africa prior to this and basically followed the supermarket's expansion path. Although this model involves the expansion of overseas production (through a US$2 million investment in this case) rather than export from the home country, it illustrates the potential of partnering with major supermarket chains (e.g. Shoprite, or Kenya's Nakumatt) as they expand rapidly across the continent, targeting especially higher-income urban consumers who might be interested in Botswana's higher-quality beef products. Botswana's geographic closeness and strong market linkages with South Africa could represent a competitive advantage in this regard.

The most interesting markets for beef in sub-Saharan Africa in terms of a combination of import volume and prices are Angola, South Africa and the Congo (Table 14). [43] However, the other countries listed appear to be markets worth exploring, especially higher-priced markets such as Mauritius, the Comoros and Equatorial Guinea. Some characteristics of the most promising of these markets are described in the following sections.

Nigeria

Nigeria's US$9 billion market for red meat products is the second largest on the continent after South Africa (Connors 2011). An estimated 10 million Nigerians moved into the middle income bracket in the past five years and their food-buying habits have changed along with their incomes. This includes, increasingly, buying packaged cuts of beef from the supermarket's retail shelves instead of from open air markets, especially if these packaged beef products are offered at competitive prices. Unfortunately, imports of beef into Nigeria are banned and the only way to get

[42] Zambeef's turnover was US$162 million in 2010, roughly similar to BMC's 2010 turnover of US$152 million (BWP1 billion; BMC 2011). Zambeef is vertically integrated from in-house grain production to corporate retail outlets.

[43] Given the issues with the accuracy of global trade databases, the data are indicative only.

Table 14: Main sub-Saharan African imports of frozen boneless cuts by country, 2010

Importer	Value imported in 2010 (US$ '000)	Quantity imported in 2010 (t)*	Unit value frozen imported in 2010 (US$/t)	Growth in value 2006–2010 (%)	Growth in quantity 2006–2010 (%)	Growth in value 2009–2010 (%)
Angola	90,956	24,902	3,653	−22	−63	13
South Africa†	56,176	19,789	2,667	–	–	–
Congo	29,487	8,682	3,396	75	−28	21
Gabon	20,748	6,191	3,351	52	−43	39
Senegal	9,697	5,676	1,708	−22	−37	−14
Ghana	7,352	5,199	1,414	17	−34	42
Côte d'Ivoire	9,647	3,404	2,834	−43	−70	8
Mauritius	10,600	3,165	3,349	26	−25	11
Comoros	6,064	1,910	3,175	114	−28	26
Equatorial Guinea	6,981	1,746	3,998	75	−19	72

* Frozen cuts only, as imports of fresh cuts are negligible outside of South Africa.
† Numbers for South Africa were corrected using mirror data to capture imports from Botswana.
Source: Authors, based on International Trade Centre Trade Map data.

into the market for fresh/frozen beef is through direct investment in local production as illustrated in the case of Zambeef above.

Zimbabwe

Given the dramatic decline of Zimbabwe's commercial beef production system, it can be assumed that there is room on the Zimbabwe market for high-quality prime cuts, which the country itself can probably no longer produce in sufficient quantities to meet demand. With processors operating far below capacity, Zimbabwe could be a market for animals and meat from Ngamiland, where animals are vaccinated against FMD and thus cannot be exported to the EU. This opportunity became more concrete with a 2011 agreement between Botswana and Zimbabwe for the export of 30,000 live FMD-vaccinated cattle for slaughter in the recently refurbished Cold Storage Commission (CSC) abattoirs in Bulawayo, Zimbabwe.[44] Although this is a temporary market channel, it may last for several years.

Mozambique

Mozambique came out of its protracted civil war in 1992 with a total of around 200,000 head of cattle and beef was and still is in short supply. The people of Mozambique have always relied on a variety of sources of animal protein: locally produced beef, small ruminants (particularly goats), pork from both commercial and peasant farms, game and fish. It is estimated that only 30 percent of the animal protein consumed in Maputo is red meat, mainly imported from South Africa and (through a lively informal trade) from Swaziland. Prices depend greatly on where and how the meat is sold. On the local market meat was sold in 2010 for 150 Mozambique New Meticals (MZM)/kg (US$4.64/kg)[45] with very little differentiation in prices between cuts or even animals (game, goat, sheep or beef). Supermarkets offer more choice in terms of cuts and more-expensive meat. The

[44] Discussions to export the first 1,300 live cattle were ongoing at the end of 2011. The sale price was set at a flat rate of BWP2,000/head, excluding transport costs (Sithole 2011).

[45] Based on a US$:Mozambique New Metical ratio of 1:32.3 (www.oanda.com – 31/12/2010).

retail price for pre-packed cuts is MZM250–350/kg (US$7.7–10.8/kg), which is higher than prices in Botswana's supermarkets (US$6–8/kg).

Angola

After many years of war, the Angolan economy is now growing at over 30 percent per year, and there is strong demand for meat. During the war years there was a large surplus of cattle in the south of the country, but they could not be brought to the north. This is now possible, but demand still exceeds supply. Angola imported beef extensively from South American sources during the war years. People in Luanda (population of 4 million, more than twice Botswana's population) and other coastal urban centres lived largely on imported food. With the oil dollars flowing into the economy, there is sufficient capital and customers for various qualities of meat. On the higher end, the market is still supplied from Brazil and Argentina, as before, while at the lower end India has become a big supplier (accounting for 50 percent of Angola's beef imports in 2010). Over the last 10 years Angola officially imported between 10,000 and 20,000 tonnes of beef per year (FAOSTAT), with imports in 2010 estimated at 25,000 tonnes (ITC Trade Map). Botswana can take advantage of the Status of Equivalence global trade protocol, which allows trade in live cattle and beef between countries with the same FMD status. This provides an opportunity to export from Ngamiland both live cattle to two abattoirs established in southern Angola and beef from the Maun abattoir directly to urban markets throughout Angola. The Mozambique and Zimbabwe markets also fall under this protocol.

4.6 The domestic market

The domestic market is quite important for Batswana cattle producers, especially for the communal and emerging commercial producer. Operating largely in the absence of imports (protected SADC market), demand will have to follow supply, which fluctuates strongly each year in response to climatic and price conditions. Botswana is considered to be self-sufficient in beef. This study estimates the domestic beef market in 2010 at 22,000 tonnes of bone-in beef with an additional 4,000 tonnes of beef that is not marketed but rather consumed by the producers themselves (see Annex 3 for the estimates). Given Botswana's population of two million, this implies a per capita beef consumption of 13 kg per year, which is low relative to consumption in neighbouring markets.[46] It is therefore of critical importance to ensure that the local market for beef is further developed.

Domestic market prices for live cattle are typically based on the BMC's posted prices, with a discount for non-BMC sales. This discount is associated not only with sale into the lower-priced domestic retail market, but also with lower transaction costs (including transport cost to the BMC abattoir) and lower risk (e.g. of rejection because of quality or traceability error). The Central Statistical Office (CSO) records the prices of cattle in the country's six agricultural regions (see Annex 4). As expected, prices are highest in Francistown and Gaborone because of the proximity of consumers and export-market processors. They are the lowest in Maun region/Ngamiland, where there are restrictions imposed by recurrent FMD outbreaks and the fact that animals are vaccinated against FMD and cannot easily be transported to other parts of the country.

Prices vary by location, quality, season and year (Table 15). Live cattle prices at slaughter weight vary from BWP2,000/head for an underweight animal (less than 180 kg) to BWP5,600/head for a prime-grade feedlotted steer (BWP25/kg × 225 kg CDM). Retail beef prices range from BWP20/kg for stew sold in Maun butcheries to BWP59/kg for fillet sold in supermarket butcheries in Gaborone. Although there are seasonal prices effects that affect the data in the table, there seems to

[46] For comparison, annual per capita beef consumption is 16 kg in South Africa, 65 kg in Argentina, 18 kg in the EU and 4 kg in Egypt (USDA/FAS 2006). Average overall meat consumption globally is 46.6 kg, 25 kg in Botswana, 49 kg in South Africa and 34 kg in Namibia.

be an upward trend in prices of both livestock and beef. The constant cattle farm gate prices probably reflect the absence of analytical updates based on actual price data over the time period.

Table 15: Selected beef and cattle prices in Botswana

Product	March 2012 BWP	August 2011 BWP	November 2010 BWP
Average retail price stewed beef in Maun	27/kg	20/kg	24/kg
Average retail price beef fillet in Gaborone	59/kg	51/kg	45/kg
Farm gate price	2,500/head in Maun 4,500 in Gaborone	2,500/head in Maun 4,500 in Gaborone	2,500/head in Maun 4,500 in Gaborone
BMC price for CDM (under 180 kg/above 180 kg by grade)	11/19–25/kg	11/19–25/kg	11/16–21/kg
BMC price for live steers for feedlots (by weight & dentition)	5.50–11.80/kg	5.50–11.50/kg	NA

Source: Monthly Price Bulletin of the MoA and BMC. [47]

The number of cattle slaughtered at municipal abattoirs is growing by about 4 percent per year (Figure 9),[48] while the proportion of animals slaughtered at BMC and municipal abattoirs increased from roughly 15 percent in 1984 to 45 percent in 2009 (Figure 10). The latter shows that slaughter for the domestic market has grown faster than slaughter for export. It also does not include all the slaughtering slabs and non-municipal slaughter facilities that cater to the domestic market, which is thus even larger than estimated here.

Assuming that beef consumption in Botswana will grow at a more moderate pace of around 3 percent per year over the next 10 years (combining population growth and increasing per capita consumption), the domestic market will grow to over 40,000 tonnes of bone-in beef by 2022, i.e. it will absorb an additional 14,000 tonnes (70,000 carcasses of 200 kg) by 2020. At that point, per capita consumption will be similar to that of South Africa. If productivity and production do not increase markedly over the coming 10 years, the annual exportable surplus will decline by 14,000 tonnes. Even if we assume a slower consumption growth of 2 percent per year, the domestic market will absorb 11,000 tonnes (55,000 animals) more beef in 2022 than it does today.

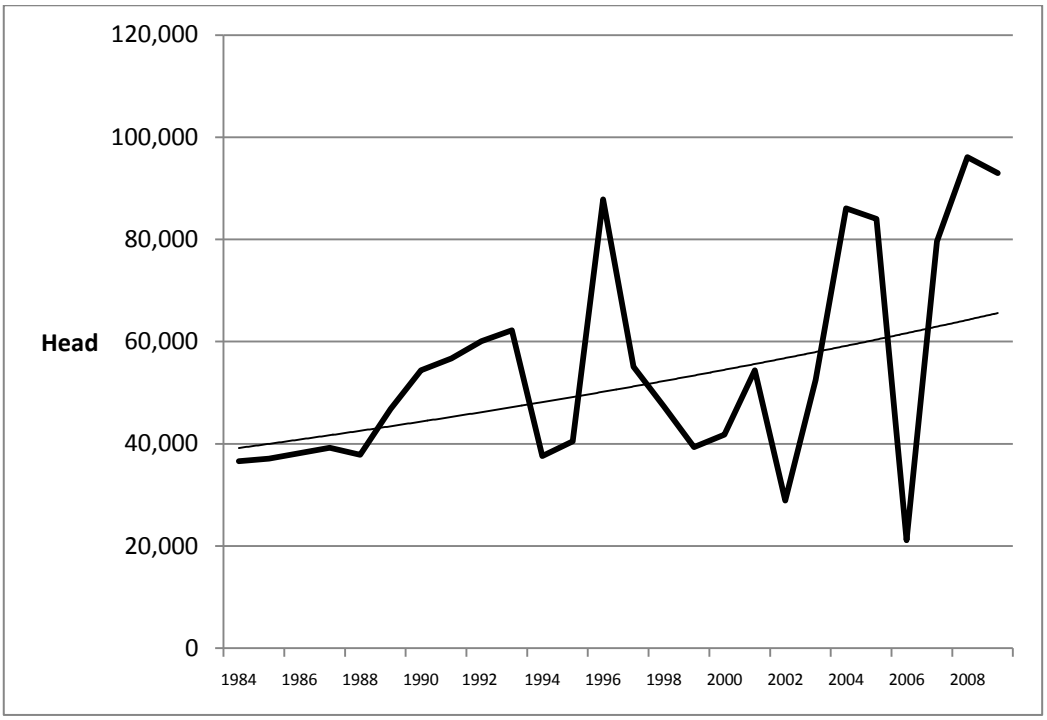
Fresh beef is sold retail by butcheries and supermarkets, with prices and cut differentiation being higher in supermarkets. If we exclude an estimated 4,000 tonnes of beef that is consumed by farmers or their neighbours, friends and family, the value of the domestic retail market can be estimated at BWP705 million, or similar to the value of beef exports (see Annex 3). Beef sales through supermarkets and other modern retail formats such as cash-and-carry operations are estimated at BWP125 million (Annex 3), or roughly 20 percent of the beef market. The remaining 80 percent is sold through butcheries. Butcheries, especially in rural areas, by and large do not separate their meat into different cuts, but rather sell all the cuts at the same price (Malope and Ransom 2009). Although independent butcheries still dominate in the local market, supermarkets are rapidly increasing their share (see Section 8.2). This implies that there will be a growing market

[47] Selected months are available for downloading from www.moa.gov.bw). BMC price data are currently set on a weekly basis and made available from their site (www.bmc.bw).

[48] This could also reflect an ongoing shift from informal processing in rural areas to more-formal processing in municipal abattoirs, but there are no indications or data on such a shift.

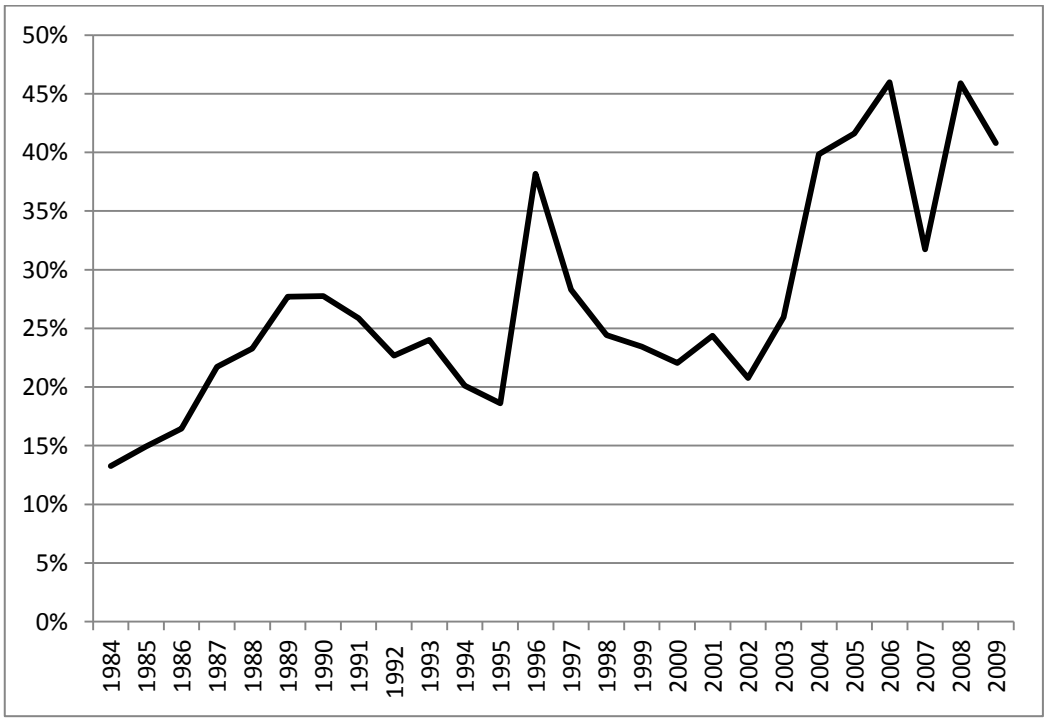
for quality differentiated meat and that quality and safety standards will become more important in the domestic market.

Figure 9: Cattle slaughtered at municipal abattoirs, Botswana, 1984–2009



Source: Authors, based on data provided by Central Statistical Office, Botswana.

Figure 10: Share of municipal abattoirs in total slaughters, Botswana, 1984–2009



Source: Authors, based on data provided by Central Statistical Office, Botswana.

4.7 Summary and conclusion

The following take-away messages follow from the analysis above:

- Global beef trade is currently still characterized by supply catching up with demand. As such, prices will continue to increase for two or three more years, after which prices are expected to level off and remain level for the foreseeable future.

- The EU market remains a key target for Botswana. Even as Botswana's market-entry advantages are eroding and competition increases, it still offers the best value/volume option, especially if Botswana can move to a higher value-added beef product.

- Botswana should target the Russian market for lower-quality cuts, given its huge size and tendency to shut out key existing suppliers on SPS grounds.

- The Middle East (particularly Bahrain, Egypt, Iran, Iraq, Qatar, Turkey and the UAE) offer some of the best growth opportunities if halal beef can be commercially produced in Botswana. This is a realistic possibility given that Botswana is already linked to the South African National Halaal Authority via the Botswana Muslim Association.[49] These markets are growing fast and are high-value markets, with the exception of Turkey and Egypt which are more interesting for their size (although Botswana could focus on the higher-priced segment of the market).

- Botswana should also diversify into markets in Africa, beyond South Africa. Angola and Congo are the largest markets, but Mauritius, the Comoros and Equatorial Guinea are also worth investigation. African beef markets are not only growing fast, Botswana should also have a comparative advantage in addressing them, based on location. Partnerships with South Africa's spreading supermarket chains and direct investment should be considered as options in an African expansion strategy for Botswana.

- Botswana should move to an end-user, value-added strategy (upgrading, differentiation) for as much of its production as possible. This would not only allow the capture of a higher margin, it would also play into significant trends in key markets such as the EU, for example on environmental and animal welfare issues. It would require positioning Botswana at the top end of the market in terms of compliance with various standards. This would likely entail improved packaging, branding, market research, marketing investment and a national standard (similar to the FAN Meat standard in Namibia). Organic beef may be another market option, but is probably too ambitious at this point given that organic standards are even more demanding than a standard such as FAN Meat, and given the current struggles to market conventional beef.

Picture 11: Halal beef in a Botswana butchery

[49] The total kill at the BMC was also indicated as being halal (BMC/GRM 2007).

- The government should support development of the domestic market. The domestic market is on a clear long-term growth path and represents a key growth opportunity for communal farmers. The latter would likely also benefit from allowing live cattle (weaner) exports.

5 Value-chain map and channels

5.1 Value-chain map

Figure 11 provides a simplified depiction of the beef subsector in Botswana.[50] This section discusses the channels and the main points of leverage in the system. Various stakeholders and activities are discussed in greater detail in Sections 6 to 8, including the derivations of the quantities indicated in the map (see also Annex 3 for an overview). These quantities reflect the year 2010, which was an exceptional year in that large volumes flowed through the export channel yet was the last "normal" year before the FMD outbreak of 2011 and the resultant exclusion of Botswana beef from the EU market.

5.2 Various channels

5.2.1 Introduction

Two basic sets of channels can be distinguished in the Botswana beef subsector: the export channels and the domestic and largely urban market channels.

There are several subchannels that a slaughter animal may follow from the farm until it arrives in the retail market. A farmer may go directly to a processor or nearby butcher. Alternatively, agents or speculators may buy from farmers at DVS-constructed kraals in marketing centres on announced days (e.g. the DCP scheme of the BMC falls under this). In terms of offtake, 28,000 tonnes of boneless beef (180,000 head) moved through the export channel, of which 3,000 tonnes were diverted back to the domestic market, leaving 25,000 tonnes of exported beef (boneless). An estimated 19,000 tonnes of beef (111,000 head) moved through the domestic channel in 2010; thus, including the 3,000 tonnes diverted from the BMC, the domestic market can be estimated at around 22,000 tonnes of beef, mostly bone-in. Offtake fluctuates widely from year to year. About one-third of the offtake comes from feedlots into which farmers of all types sell weaners.

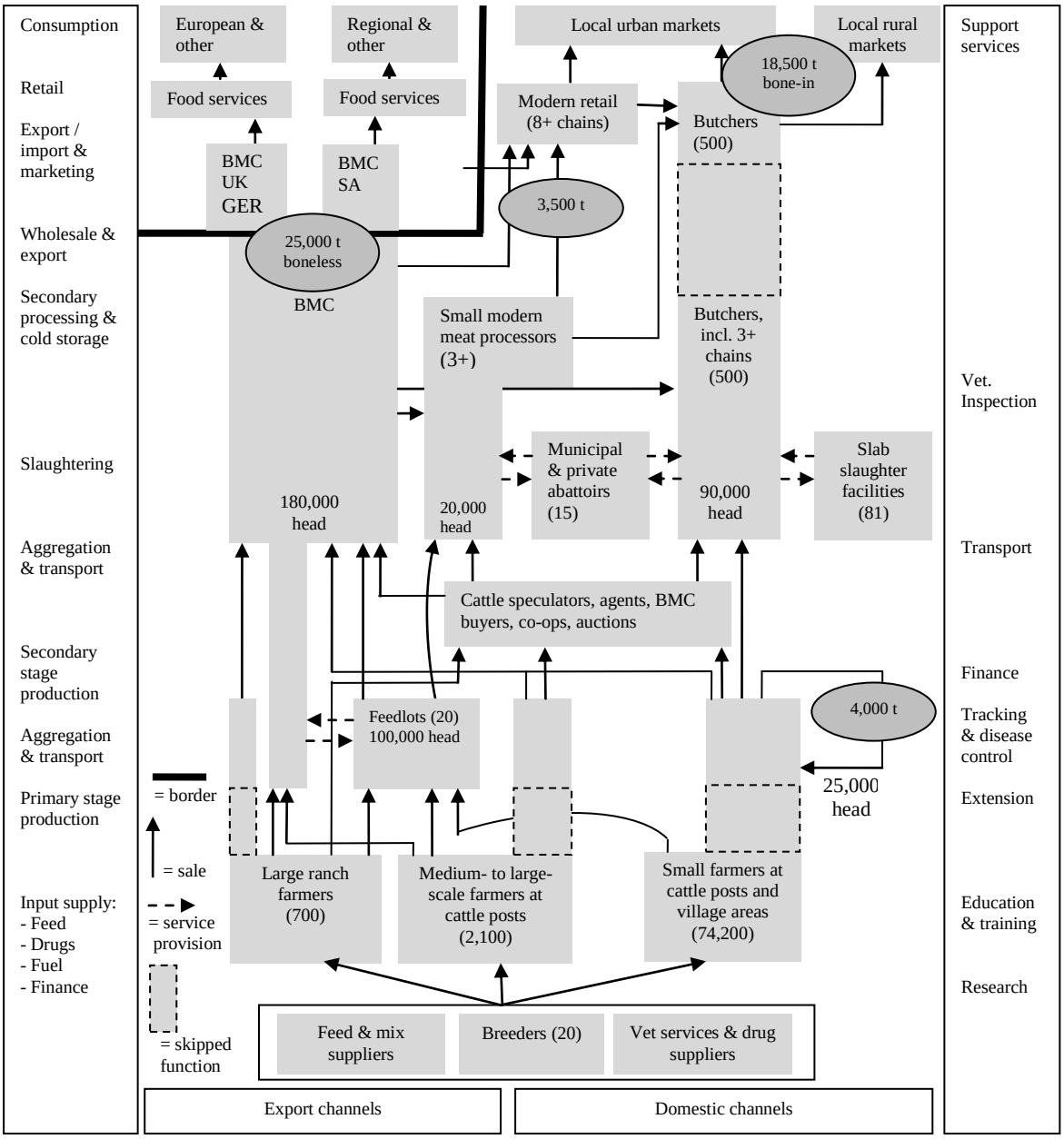
In addition, it is estimated that 25,000 head of cattle (4,000 tonnes of bone-in beef) are slaughtered each year by farmers for their own consumption, i.e. social events such as weddings, funerals, and other ceremonies. On these occasions meat is usually cooked fresh and pounded to make "*seswaa.*" This is indicated in the map but left out of the analysis elsewhere given its non-commercial nature (even though it does of course impact overall beef consumption in the country). This is "missing beef" in the statistics: animals that are not reported as slaughtered and which might at times be slaughtered without veterinary inspection.

5.2.2 Export channels

In the export channel, cattle flow to the BMC from a small group of medium- to large-scale commercial cattle farmers on ranches or at cattle posts and from smaller-scale, less market-oriented farmers at cattle posts or on village grazing areas. Although there are a large number of direct suppliers (e.g., almost 8,000 in 2010 according to BMC data), the supply is fairly concentrated. In

[50] There are many more linkages throughout the beef value chain and the system is more complex than depicted. For analytical clarity, only the most significant linkages in terms of volumes and values are indicated. To avoid overcomplicating the map, sales of by-products was left out of the map.

Figure 11: The Botswana beef value chain map, 2010



Source: Authors' estimations based on a wide variety of sources. See Annex 3 for more details.

2010, for example, 64 percent of the animals sold into the export channel came from only 78 large suppliers (BMC data). These included 10 feedlot operations (four private, six BMC), 18 farmer cooperatives, 13 beneficiaries of the BMC feed advance scheme[51] and three cattle agents, who procure the majority of their cattle from communal farmers of various scales. According to our estimates, around 15 percent of the BMC animals originate from ranches and 85 percent from communal farms. Roughly half the animals purchased by the BMC come from smallholder farmers (herds of fewer than 150 head), 60 percent as weaners and 40 percent as oxen.

[51] Under the feed advance scheme, the BMC provides low cost funding for farmers to purchase both weaners and feed.

Large-scale ranchers and large-scale communal farmers sell their animals directly to the BMC either at full slaughter weight or (less commonly) as weaners. The BMC contracts with feedlot operators (all of whom are also large-scale ranchers) to get weaners it has purchased up to slaughter weight under the DCP programme. While the DCP scheme accounts for the bulk of the feedlot animals (around 55,000 head out of a total of around 80,000 head), the BMC also buys from private feedlots (most notably Feed Master) and in 2010 the BMC's feed advance scheme supported some 40 farmers with smaller feedlot operations. The feedlot–weaner system has grown rapidly in the last few years and is displacing the purchase of slaughter-weight animals. The export channel is mainly geared towards animals with 0–2 teeth and a CDM of at least 220 kg and that are preferably less than two years old. This weight can be reached far more efficiently and faster if the animals are at least partly raised on supplementary feed and not on grazing alone. This is done in feedlots on a largely imported diet of straw, grain and premix.

The traceability system required for EU market entry is also more easily implemented in the feedlot system. Cattle have to be traceable from birth, with documentary evidence that the animal was slaughtered within the withdrawal period for any antibiotic used. Animals must have been in an EU-approved part of the territory (disease-control zone) for at least 90 days before slaughter and on the last holding before slaughter for at least 40 days. This means that only animals from holdings that have full animal identification and registration and records on drug use are eligible to sell animals directly to BMC for the EU export market. Feedlot operations with an average feeding period of 100 days meet the 90/40-day requirement. Smallholder producers, whose animals are identified through the traceability system only at the time of transport, would have difficulty complying with the 90-day rule.

In turn, the BMC, as the sole licensed exporter of beef products from Botswana,[52] performs both primary and secondary processing, keeps beef in cold storage and markets it internationally, including on regional markets, of which South Africa is by far the most important, and more remote markets, of which the EU is the most important. The BMC has subsidiaries in South Africa, Germany and the United Kingdom). Small volumes of slaughtered cattle (roughly 10 percent) are sold to smaller processors, butchers and modern retailers in the domestic market. (Volumes sold on the domestic market are greater when export markets are cut off, as was the case in 2011 when EU exports were halted.) Carcasses of animals not qualifying for the EU or other high-value export markets are: (1) sold to the trade operating on the domestic market; (2) processed and sold in the domestic market (e.g. in the case of "beef measles"); or (3) sold into other less-demanding export markets.

5.2.3 Domestic channels

In the domestic market there is a dominant butcher (and small shops) subchannel and a small but growing supermarket subchannel. There are an estimated 500 butchers across the country, some organized in chains, and three registered cold storage, cutting and processing plants that produce portioned and processed meat products for the urban supermarkets.

Both subchannels start from the same source. Butchers and supermarkets finance agents to go to the marketing kraals to buy animals for them according to their specifications. This channel will take a wider range of animals than the export channel, ranging from high-quality animals from feedlots to those that are too old for the EU market or do not meet the minimum weight requirements. There is some vertical integration, with smaller processors operating their own feedlots and some feedlot operators selling into their own slaughter facilities and butcheries. (These integrated business models are not shown on the map of the beef value chain because they appear

[52] One or more of the other processors have requested an export permit, but as far as the authors could establish have not yet received one.

to be limited in terms of throughput relative to the overall system [although no hard data are available on this] and also in order not to overcomplicate the map.)

The smaller meat processors (in the modern retail channel) and the butchers then arrange transportation to pick up the animals from the kraals or feedlots and to take them to one of the municipal or private abattoirs for slaughter. These abattoirs have recently been brought under the control of the DVS, which made an inventory and completed a registration and licensing exercise. According to the list provided by the DVS, there are currently 100 such registered slaughtering facilities handling red meat, including seven linked to processors and butchery chains and 12 municipal abattoirs (three of which are currently closed). Except for those owned by butcheries and processors, these facilities are fee-based service providers that do not take ownership of the cattle or the beef. Some butchers, especially those in smaller towns close to cattle producers, slaughter their purchased animals at one of the 81 private rural slaughter facilities and slaughtering slabs for red meat registered with the DVS.[53] The smallest butcheries may even slaughter animals illegally in an open field. These rural slaughter facilities and slaughtering slabs are inspected daily by DVS officers and can handle 20 cattle per day or more.[54] They are mostly linked to local butchers' stores that slaughter according to their expected sales volume. Over time, slab butcheries will have to be upgraded to abattoirs or they will be shut down.

Butchers have their own retail operations and sell not only in the urban areas but even in smaller rural towns. Smaller meat processors sell their meat mostly to the country's supermarkets. The latter also sell small quantities of fully processed beef products imported from Namibia. The map of the beef value chain does not show food service providers, as sales of beef by these are not documented. Restaurants buy their beef from either supermarkets or butchers, not directly from meat processors. Larger institutional buyers (e.g. the army, schools) buy meat directly from small meat processors and the BMC.

5.3 Points of leverage

Leverage is the process of targeting an intervention at points in a system that can generate broad change throughout the value chain. Leverage points can be nodes in the system (e.g. a firm or a geographic area) through which a large volume of the commodity flows or where many value-chain stakeholders connect, or they can be an element in the enabling environment, such as a policy. These leverage points can generally be found in four different components of the value chain:

- Economic structures
- Social structures
- Economic incentives
- Social incentives.

Economic structures are defined as organizational nodes through which product, actors and resources flow. In the Botswana beef value chain, the BMC is the main economic structure. The network of 36 Livestock Advisory Centres (LACs) is a potential a leverage point for inputs and advice, but seems to have lost this function because of budgetary constraints. The DVS, which is responsible for the traceability system and the regulatory oversight of meat processing facilities, is another key economic structure. Livestock markets could assist value-chain actors specializing in, for example, the production of breeding animals for use in commercial cattle production in other parts of the country. Such livestock markets could also be used for slaughter animals, which could increase the competition for animals and provide an alternative price-base than the BMC-stipulated

[53] In addition, there are three rural slaughtering facilities for game meat in the DVS register.

[54] The operator of one rural slab facility visited by the authors indicated that they could handle 35 animals per day if DVS inspectors were available at the slab for a longer each day.

prices that currently seem to be used to set the price. By accepting older animals, such livestock markets could have a competitive edge over the BMC. However, currently there are only a few sales of breeding stock each year and the use of live-cattle trading points, such as those the CSC established in the communal lands in Zimbabwe, is in only an experimental stage in Botswana.

Picture 12: Farmer making a purchase at a Livestock Advisory Centre

Social structures are different from economic structures in that their potential leverage comes from social status or position in a community. Given that a high percentage of the livestock owners live in town, there is little to no cohesion between producers based on location. Sometimes the syndicates around cattle posts are a binding factor, but usually this only concerns payments for water and possibly some guarding. There are local cooperatives that are members of the Botswana Agricultural Marketing Cooperative Union (BAMCU) but only small numbers of cattle are marketed through them.[55] Most farmers have their own herder and organize all other activities (e.g. inputs, marketing) independently. The BCPA was formed on an interim basis as a hybrid organization of 14 regional general farmer associations. This association was successful in spurring the current mechanism for setting export parity price for beef. It has since been replaced by the National Cattle Producers' Council, which consists of the chairmen of locally elected district cattle producers' councils. Private veterinarians can play an important role in the value chain as a link between livestock owners and the government veterinary services. The provision of government veterinary services, some of which are free of charge, to individual farmers seems to be weak at the moment as a result of a combination of a high work load associated with a large set of public tasks and a lack of sufficient resources (staff, transport). This leads to complaints from farmers that veterinarians are never available when needed. Veterinarians from government services are increasingly going into private practice; this, combined with a different division of tasks between government and private veterinarians, could allow private veterinarians to become a leverage point in the value chain to achieve improved productivity and compliance with existing rules and regulations.

Economic incentives can be highly effective at fostering systemic change. Competition is a strong economic incentive for companies to improve their performance. For example, competition for slaughter animals could lead to better prices for producers. In a monopoly situation, economic incentives to keep a company "sharp" may be lacking. For example, in 2005 the BMC paid half the export parity price then applicable. Several beef operators started to compete with BMC on the local market quite successfully and created competition that likely contributed to a change in the BMC's pricing structure. Innovators can show others that they need to change or be outcompeted in the market. Market liberalization could stimulate innovation by new entrants, making the market more competitive and thus incentivizing the BMC to upgrade its operations. Namibia, for example, has six beef exporting companies, "united" under the Meat Board of Namibia. This drives innovation, positioning in the market and product differentiation (e.g. the Nature's Reserve brand).

Social incentives come from working in groups and are an important complement to the advantages of the economies of scale that are, for example, related to having a shared

[55] For example, some 40 cooperatives delivered a total of 10,000 head of cattle to the BMC directly in 2010 (BMC data).

infrastructure. For example, compliance with challenging rules and practices, such as livestock registration and the maintenance of records on drug use, is easier to achieve within a group than for individual farmers. It likely that, with better social structures, social incentives such as increased access to (micro)finance might become more widely available to individuals in a farmers' group. Such groups can leverage social incentives to limit defaulting on credit (continued access to finance) and social pressure can be used to foster behavioural change, such that compliance with rules and regulations improves.

6 Production

6.1 Introduction

According to the latest data available, there were roughly 77,000 cattle farmers in Botswana in 2008 (CSO 2012). These farmers operate on around 333,000 km^2 of pasture land (GoB 2007), with 76,300 communal households occupying 80 percent of this area (260,000 km^2) and 700 ranch farmers operating on 20 percent (73,000 km^2). Of the 77,000 cattle farmers, roughly 40,000 (52 percent) have fewer than 20 cattle, 60,000 (78 percent) have fewer than 40 cattle, and 75,000 (97 percent) have fewer than 150 cattle (GoB 2007).

Cattle production in Botswana is highly cyclical, depending upon rainfall[56] and pricing structures. Farmers sell animals during droughts, flooding the market with poor-quality animals and driving prices down, and the rebuild their herds when rainfall is good, reducing the number of animals for sale and driving up prices. Map 1 shows rainfall distribution in Botswana, indicating the small area of the country receiving more than 600 mm of rain annually.

Between 1995 and 2010 the total number of cattle in Botswana fluctuated between 2 and 3 million head (Figure 12). For 2010, the CSO estimate of the national herd size is 2.7 million (CSO 2012). The cattle population could be increased significantly, but this would require reducing dependency on extensive grazing through changes in husbandry and marketing systems.[57]

There is now a tendency for the market, especially the BMC but also the smaller meat processors, to create mechanisms to increase offtake during good years through increased prices and by adding additional value to animals through feedlotting. The latter brings animals up to a suitable slaughter condition with 0–2 teeth, which is not possible in drought years with only grazing. This is reflected in Figure 12 in the smoother increase of cattle numbers since 2007.

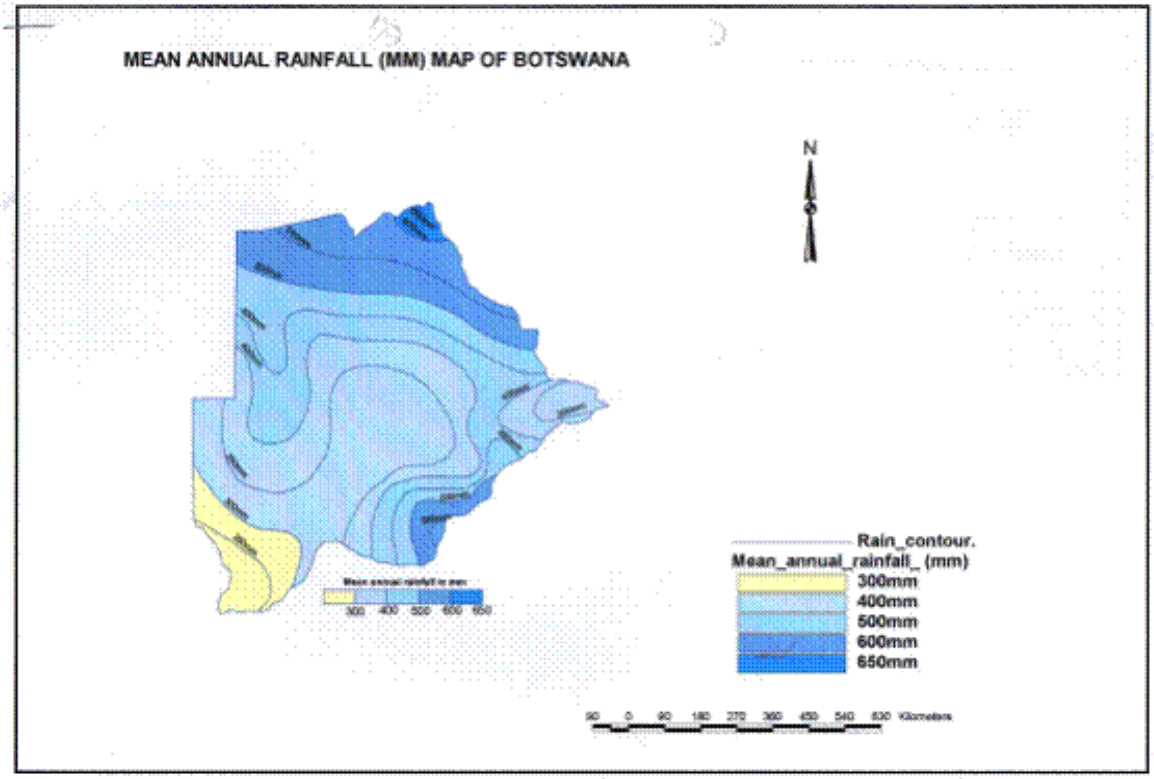
Livestock herd sizes in Botswana also vary because of farmers' choices. For example, in the early 1990s many commercial farmers opted to change to game farming and reduced their livestock numbers.

In the past there was a tendency for the scientific literature to present constant figures for animal numbers, carrying capacity of the range, livestock productivity, offtake and mortality. It is, however, increasingly clear that these factors vary widely in space and time in extensive beef production schemes in semi-arid areas and a new school of thought is gaining ground that takes this disequilibrium in account (Benkhe *et al*. 1993). The number of livestock in the country also

[56] Rainfall (drought) is in part linked to climate change, an important environmental factor. For a discussion, see Murphree (2010).

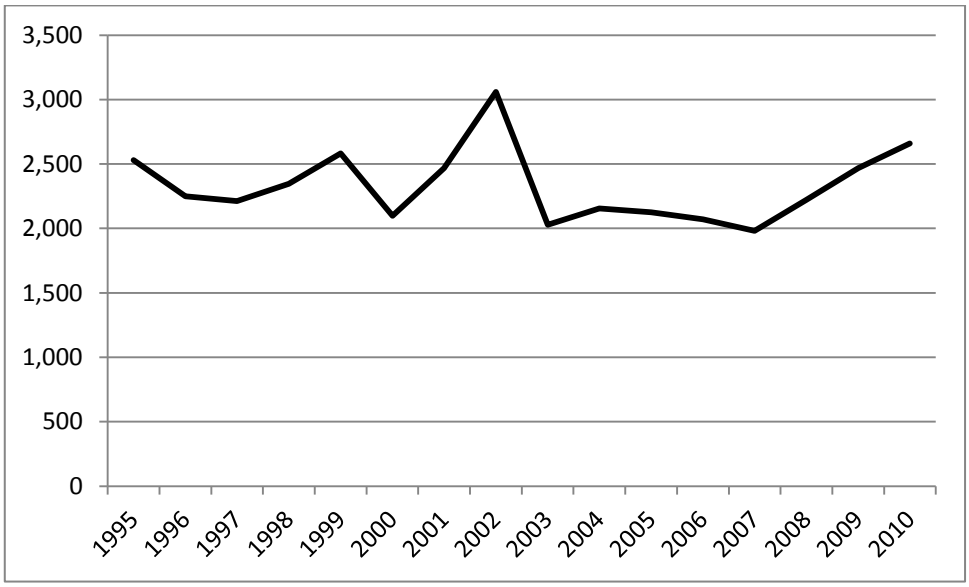
[57] For example, where conventional ranchers count on 14 ha/mature livestock unit (MLU), ranchers practicing holistic range management (aka intensive production) can manage with 8 ha/MLU. A complete shift to holistic range management would, theoretically, allow 75 percent more cattle to be kept.

Map 1: Rainfall distribution in Botswana



Source: Government of Botswana.

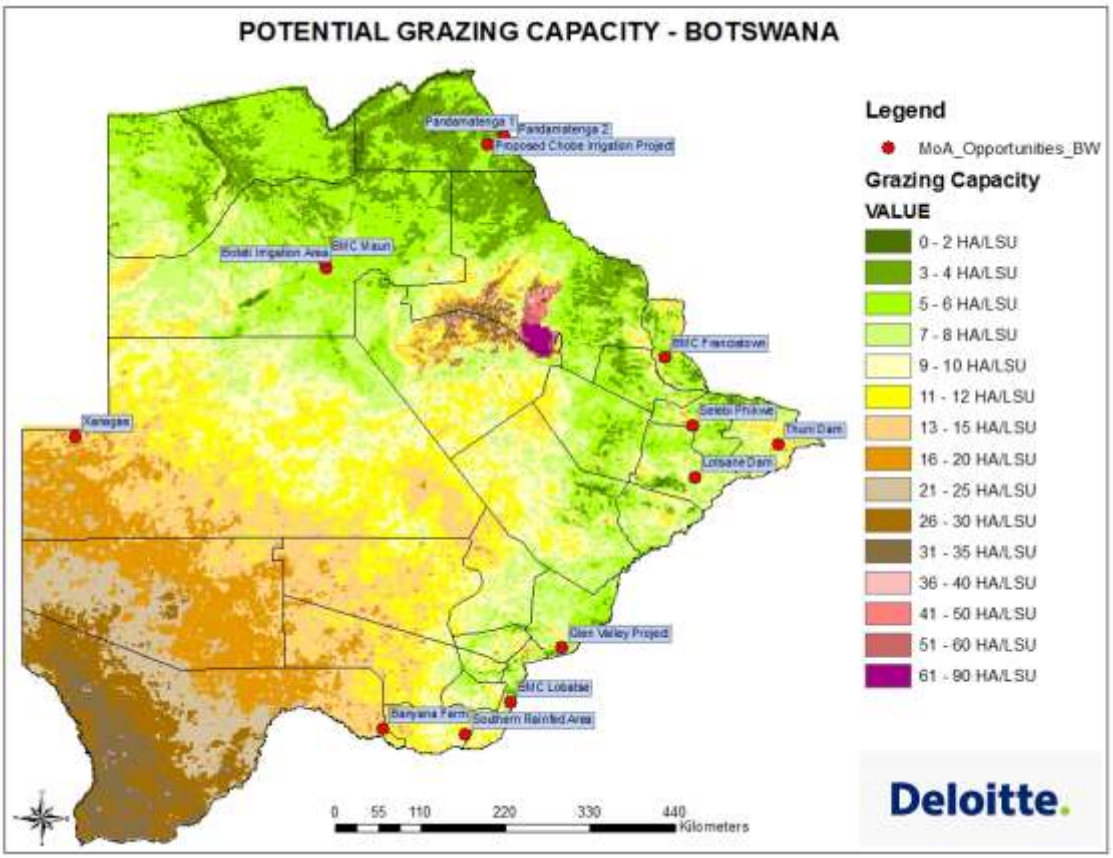
Figure 12: Number of cattle in Botswana, 1995–2010 (thousands)



Source: Authors, based on CSO/FAO statistics.

fluctuates with the rainfall and so do calving rate, mortality and the carrying capacity of the range. Map 2 shows the potential cattle carrying capacity of the land throughout Botswana.

Map 2: Potential grazing capacity in Botswana

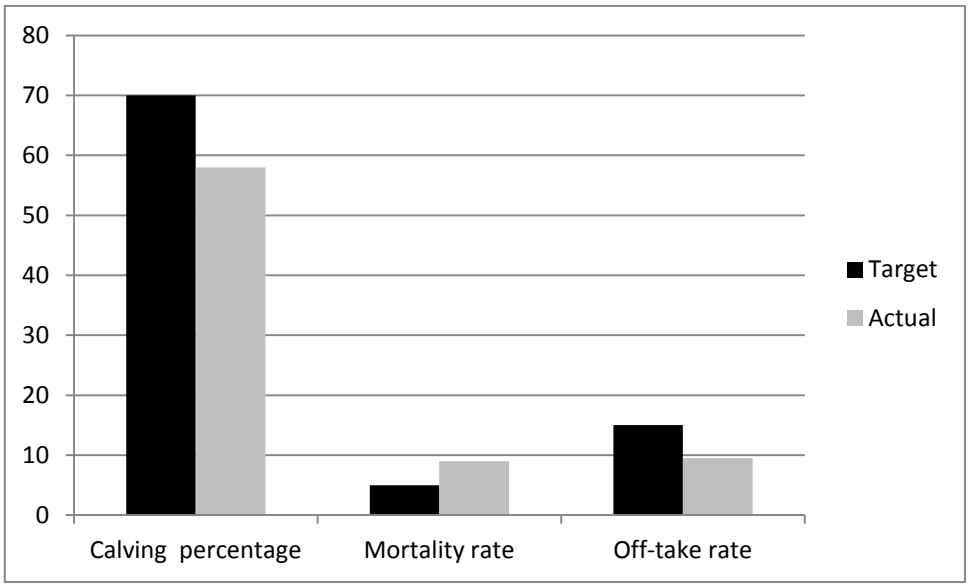


Source: Deloitte.

The CSO tries to establish general production parameters for the various production systems for each year through a stratified sampling framework and compares them to the performance targets set in the various national development plans. Figures 13 and 14 illustrate such a comparison for 2008, broken down by production system (large-scale commercial versus mixed-size communal). They indicate that only targets for mortality were met or exceeded in either system. Botswana's overall offtake rates of around 12 percent are far below those of Namibia, which are around 20 percent (Jefferis 2005), and those of leading beef exporters such as Brazil (18 percent) and Australia (24 percent) (GoB 2011).[58] However, it must be recognized that these differences are at least in part due to differences in terms of the ratio of commercial to subsistence producers across these countries.

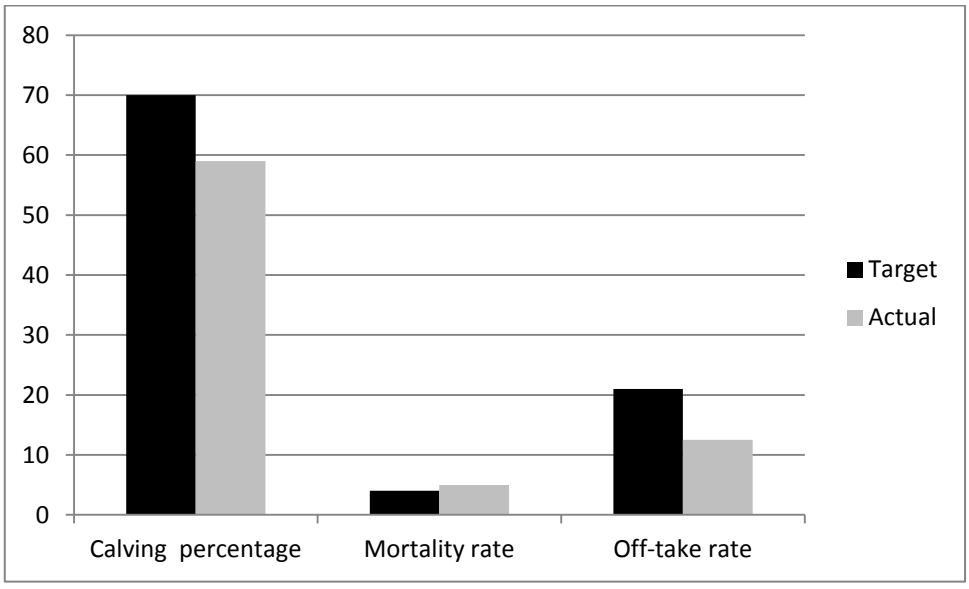
[58] It is difficult to compare Botswana's performance in beef production with that of Namibia or South Africa, as none of these countries appears to have reliable estimates available.

Figure 13: Calving percentage and offtake and mortality rates for communal farms in Botswana (%)



Source: GoB (2010).

Figure 14: Calving percentage and offtake and mortality rates for large commercial farms in Botswana (%)



Source: GoB (2010).

Changes in the production system, such as from oxen to weaners or from traditional to holistic management, would facilitate an increase in herd size and the share of adult cows in the herd (Table 16). These changes, together with better management practices (e.g. improved feeding), would also lead to improvements in calving rate and mortality. With realistically achievable improvements in these production parameters, Botswana could double its current beef production

(Table 16).[59] That it can do so based on the roughly the same number of mature livestock units (MLUs) implies that this increase in production could be achieved from the same land area currently used, or less under holistic management. Increases in animal growth rate and CDM (e.g. through improved breeds) could boost this potential even further (this is not taken into account in Table 16). However, this technical potential does not mean it is economically, socially or environmentally feasible or optimal. For example, the weaner system increases the need for feed, which will most likely cost more in Botswana than in its competitor countries (whether imported or produced domestically) and therefore will have to be compensated for by higher market prices. These issues are discussed further in this report, but additional in-depth studies are required to make these assessments in sufficient detail.

Even with changed practices, these production parameters depend on many factors beyond the control of the farmer, such as rainfall and market prospects. It is costly to set up a data-collection system to monitor such production data and it seems that some of these data are derived from detailed surveys done to assess the effect of drought or disease outbreaks and control measures. Such data are, therefore, often too ad hoc to make predictions over longer periods. It is, however, remarkable to note that, in most statistical sources and across various years, there is little difference in the calving rate between smaller-scale communal cattle farmers and larger-scale commercial ranches. This is one of the most important parameters determining the technical and financial performance of a beef production system. Without a calf there is no weaner, and thus no beef, but the cow still has to be fed and cared for and is at risk of disease and death.

Table 16: Potential impact of improved production parameters in Botswana's beef value chain[60]

	Current (2010) (oxen + weaners)	Future (expanded weaner system)
Herd size	2,700,000	3,000,000
Mature livestock units	1,944,000	1,980,000
Breeding cows (%)	40	45
No. of breeding cows	1,080,000	1,350,000
Calving rate (%)	55	65
Calves born	594,000	877,500
Mortality (%)	9	6
Net herd increase	297,540	644,850
No-growth offtake (%)	11	21
Potential beef production	45,821,160	99,306,900

Source: Authors' estimates based on Abelprojects (2006), Jefferis (2005), GoB (2010) and GoB (2007) for 2010 data. Beef production (boneless) assumes an average CDM of 220 kg and a meat yield of 70 percent.

Literature on the Botswana livestock sector usually distinguishes between commercial and communal livestock keepers and modern and traditional systems, with further subdivision into fenced and unfenced farms. These terms are inadequate to describe the underlying principles of the livestock husbandry system and the level of investment, and they oversimplify the actual situation

[59] In the long term (20 years) these parameters can improve even more.

[60] It should be noted that these performance measures reflect national averages. Commercial farms will likely achieve better results, while subsistence farms will likely achieve worse results than those indicated in the table.

on the ground. We divide the production stakeholders into four main categories: small-scale cattle farmers grazing common land; medium-/large-scale communal cattle farmers; ranch farmers; and feedlot operators. These four groups differ in terms of their expectations, norms and daily practices (Ransom 2011).

6.2 Communal system

Communal farmers graze their cattle on open pastures that are communally owned and managed and to which they do not have individual access rights. Communal livestock farmers can be divided into two groups: (1) those keeping animals at a cattle post, either living there or in town (cattle-post area [CPA] farmers); and (2) those living with their livestock in the rural settlements (settlement or village grazing area [VGA] farmers).

Cattle Post Area (CPA) Farmers: these farmers operate on unfenced areas of land with one or more boreholes located at considerable distance from settlements or towns. CPAs can be operated by individuals, groups or syndicates. Around 16,000 to 17,000 farmers fell in this category in 2010 (combining distribution data from GoB [2007] with survey data from CSO [2012]) and they range from subsistence farmers to large commercial operations. In 2002 there were 2,800 farmers with a herd of 150 cattle or more (GoB 2007), which we here use as the cut-off for dividing farmers into small-scale and medium-/large-scale operators. The larger cattle farmers often own a water source (borehole). This normally provides them with de facto rights to the surrounding grazing areas, especially in areas where there are no permanent natural water sources, and makes them comparable to farmers under the ranch system described in Section 6.3 (the main difference being the absence of fencing).

Subtracting the estimated number of ranchers in the commercial system (700) which are assumed to all fall into the +150 size category, there are an estimated 2,100 medium- to large CPA farmers that operate commercially. These farmers have been encouraged by government to shift to fenced farming (ranches). This leaves an estimated 14,000 to 15,000 smaller, less market-oriented CPA farmers. As a group, CPA farmers manage around 60 percent of the cattle in Botswana (GoB 2007), split roughly evenly between small-scale (<150 cattle) and medium-/large-scale farmers (>150 cattle). They operate on 177,000 km^2 of pasture land (GoB 2007), an average of 10 km^2 per CPA farmer (11 ha/livestock unit [LU]), albeit with this average hiding a wide range in farm sizes.

Settlement or Village Grazing Area (VGA) Farmers: These settlements have one or more boreholes, and livestock graze from the village into the surrounding grazing areas. Over the last 20 years, communal livestock farmers seem to have increasingly lost their grazing lands to newly established, government-supported fenced farms (ranches) or to unfenced cattle posts. There were an estimated 60,000 VGA farmers in 2002 (GoB 2007). These are all assumed to be smallholder (subsistence or hobby) farmers who are poorly integrated in the market and rely on diversified livelihoods strategies, including off-farm employment. They use few purchased inputs and normally sell or slaughter cattle only when they have immediate cash needs (e.g. for a funeral). VGA farmers manage around 30 percent of the cattle in Botswana. They operate on 83,000 km^2 of pasture land (GoB 2007), an average of 1.4 km^2 per VGA farmer (11 ha/LU), with probably not much variation around this average. Cattle

Picture 13: Bull at a breeder

farming on such small plots and with such small herds (around 14 animals on average) is clearly not commercially viable. However, VGA farmers are nonetheless an important source of slaughter cattle in the overall system because of their large numbers.

The single watering point of the VGA system and resultant limited grazing area,[61] together with the need for firewood and the establishment of croplands, has resulted in considerable environmental degradation around these settlements. Overgrazing results in bush encroachment (i.e. replacement of grass by bush), further lowering the carrying capacity of the range for cattle. Estimates for Ghanzi indicate 40 percent bush coverage, far higher than in the past. More VGA farmers are now keeping goats, a reflection of the reduced carrying capacity for cattle and a sign of the increasing impoverishment of the inhabitants of rural settlements. Goats are better browsers and more prolific than cattle, offering more frequent offtake.

Farmers in the communal land system, especially smallholders, usually keep female stock if they have no immediate need for cash. Oxen are grazed until they reach 4–5 years old or a slaughter weight of 200–240 kg,[62] whichever comes first. About 40 percent of the overall herd is cows of reproductive age (Abelprojects 2006, GoB 2010). At first sight, this oxen-based production system seems inefficient because it results in a low proportion of breeding cows in the overall herd. It is also risky; animals kept for 4–5 years before slaughter run a higher risk of dying than weaners sold at 9 months to 1 year or stored cattle (tollies) sold at 1.5–2 years.

On the other hand, a growing ox has a much lower risk of complications and requires less maintenance than a breeding cow. The efficiency with which the growing ox converts pasture into meat is an important factor determining the productivity of the system, along with the calving rate of the cows. The value added in the system should be calculated as the value of the meat produced per hectare of land used or per pula invested. The oxen are also accumulated wealth which can be monetized when required. Breeding cows and their calves require more care and attention than oxen, which in the communal cattle post grazing system with an absentee owner is difficult to provide. Cows and calves need kraaling and close supervision, especially in areas with predators. Close supervision is difficult in most cattle posts, given that animals wander away from the borehole and centre in search of grazing.

Farmers in the communal system commonly cross the traditional Tswana cattle with exotic bulls,[63] and it is now hard to find purebred Tswana cattle in Botswana. Many farmers buy a purebred breeding bull from pedigree breeders, as much for prestige reasons as for genetic improvement. In the unfenced communal grazing areas herds mingle, and hence there is no guarantee that a farmer's cows will be covered by his or her expensive bought-in bull rather than a neighbour's lesser bull. A better option for upgrading the herd is to use the artificial insemination programme operated by the MoA. According to the Ministry this programme is used by a large number of communal farmers.[64] Choosing a Brahman bull produces hardy cross-bred animals, but these are not well suited to feedlotting. Choosing a Simmental or other European breed bull leads to large cross-bred cattle that

[61] Animals are often not herded but are left free to graze where they like, which is typically limited to the area close to the water source.

[62] Traditionally, the average subsistence communal farmer does not actually weigh his animals. The BMC weaner buying programme that emerged over the last five years has increased the importance of the weight of animals that are going into this channel.

[63] For some characteristics of the different breeds mentioned in this report, please see: http://en.wikipedia.org/wiki/List_of_cattle_breeds or http://www.thebeefsite.com/breeds/.

[64] Artificial insemination did not emerge during the authors' interviews with farmers, indicating it may not yet play a prominent role in breeding at this time.

are more suitable for feedlotting purposes; however, these animals will find it more challenging to survive, especially in unfavourable years, than Tswana or Brahman–Tswana crosses.

Table 17 provides the distribution of communal livestock holdings by region in 2008. The largest number of holdings and cattle were found in the Central region, with the smallest number found in the Western region. This is no surprise, because the Central region is the largest in terms of land area and the Western Region is the focus of commercial livestock farming in Botswana.

6.3 Ranch system

The ranch system consists of large commercial farmers operating on fenced freehold or leasehold land, with exclusive rights to grazing resources. These ranches are referred to as commercial farmers in part because they made modifications to the traditional husbandry system. They have reduced in importance over time; in the 1980s they accounted for 30 percent of the national herd, but now account for only about 10 percent of the national herd. This decline is mainly the result of the eroding profitability of cattle production in Botswana. With 73,000 km^2 of pasture land available to them, i.e. 100 km^2 per ranch (24 ha/LU) on average, these farms have the greatest potential for production growth.

Table 17: Communal livestock holdings by region, Botswana, 2008

Region	Number of holdings	Number of cattle	Average per holding
Central	21,387	770,082	36
Gaborone	18,084	331,263	18
Francistown	13,669	296,083	21
Southern	13,588	227,629	17
Maun	4,898	167,328	34
Western	4,764	154,118	32
Total	76,390	1,946,503	25

Source: CSO (2011).

Usually these farms are fenced and they practise rotational grazing as an alternative to the former transhumance system. They used exotic genetics on Tswana animals from an early stage, starting with the then popular Afrikander and British breeds such as Sussex and Hereford, but currently they are largely making use of continental European breeds (Charolais, Simmental) and Zebu breeds[65] for a criss-cross breeding scheme. Some commercial farmers have opted for synthetic breeds such as Beefmaster or Santa Gertrudis (stabilized crosses between taurine and zebu-type breeds) to simplify the breeding operations and to have more uniform cattle.

Where in the past the fenced/commercial farmers followed a similar oxen-based production system to that used on communal farms, they have increasingly been shifting to a weaner-based production system, selling weaners to the BMC or raising them in feedlots themselves if they have the means

[65] These zebu breeds include Brahman and soon most likely also Boran, an improved zebu breed from East Africa with increasing popularity among ranchers in South Africa. Most breeding material and information for Botswana is sourced from East Africa.

to do so.[66] This change of production system has lead to a higher proportion of breeding cows in the herd and slightly higher offtake but also to a greater need for investment and a higher management level (supplementary feeding of cows, record keeping etc.).

It is estimated that there were around 700 ranch farmers in Botswana in 2010 (see Annex 3). One farm of particular note in this category is the government-owned Banyana farm in Molopo, which keeps over 15,000 cattle. As there are clear indications that herd sizes and offtake rates have increased in response to the growth in feedlotting and better prices, we have assumed that ranching accounts for around 10 percent of the estimated 2010 herd of 2.7 million head, giving an estimated commercial herd of around 300,000 units in total.

Today, ranches include a wide variety of farms, varying in size from 1,600 ha (4 × 4 km) to over 100,000 ha (Burgess 2006). Some ranches are underutilized (GoB 2007). Ranches held freehold keep more cattle per holding than those held under the Tribal Grazing Land Policy (TGLP). The TGLP ranches were created in 1975 on tribal land in an effort to increase productivity and curb widespread range degradation in communal areas. The original farms covered areas of 8 × 8 km but were reduced to 6 × 6 km during the implementation of the 1991 National Policy on Agricultural Development (NPAD).

As previously indicated, the ranch system performs only slightly better than the communal system in terms of technical productivity indicators. Part of the explanation for this is that some commercial ranches, especially TGLP ranches, operate almost the same way as a cattle post (and vice versa), the only difference being that cattle are kept in by fences on ranches and do not stray as they do on unfenced farms. Some ranches also do not have paddocks, hence are unable to practise modern husbandry techniques such as controlled breeding and rotational grazing.

6.4 Feedlot system

Traditionally, smallholder producers only sell their oxen when they have immediate cash needs.[67] As a result, they keep a large portion of the unproductive animals[68] (oxen), reducing calving rate and undermining their potential productivity (Jefferis 2007a). Carcass weights of animals slaughtered in Botswana are also low. Figure 15 compares Botswana's yield in kilograms of meat per animal slaughtered with that of some key competitors. For Botswana, the graphic shows a flat estimate of 200 kg per animal since 2004 because of a lack of data, although carcass weight appears to have increased in recent years as feedlotting has grown in importance.[69] Nevertheless, it is clear that main competitors such as Brazil and Australia are consistently improving their yields. Namibia's yields are a bit more volatile, but are clearly higher than Botswana's (around 15 percent) and have generally trended upward in the last decade.

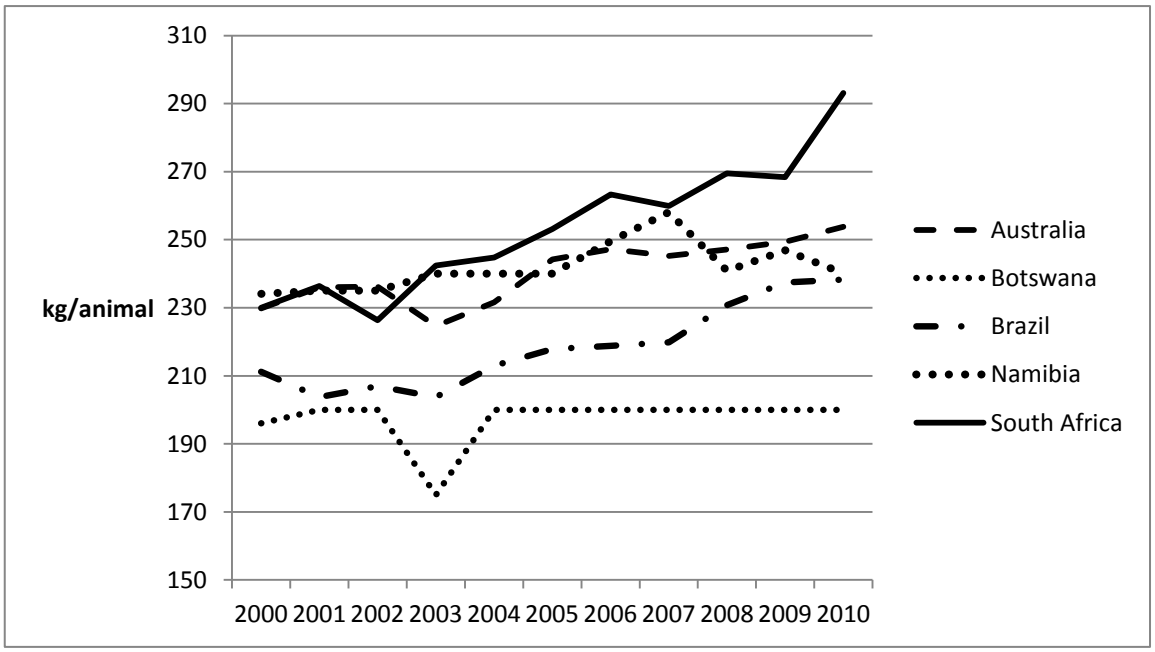
[66] This is not just a ranch-related shift. The scant data available seem to indicate that farmers of all types have, over the last few years, sold increasing numbers of weaners to feedlots. Feedlots are, however, more closely associated with the ranch system as most if not all feedlots are operated by ranchers.

[67] Oxen were traditionally used as a source of draught power, but the use of oxen as draught power is now insignificant as farmers have switched to tractors. This shift was promoted under the government's "free-ploughing" schemes such as the Accelerated Rain-fed Arable Programme in the 1980s which was reintroduced as the Integrated Support Programme for Arable Agriculture Development in the 2008/2009 planting season.

[68] The oxen are of course still productive in terms of meat production.

[69] In 2010, BMC reported an average CDM of 223 kg following three years of successive growth in CDM.

Figure 15: Carcass weights for Botswana and selected beef exporters, 2000–2010



Source: FAOSTAT.

In 2006, the government and the BMC started to promote weaner-based production as a way to increase beef production using the same or fewer grazing resources. Under the weaner system, animals are produced on range and finished in feedlots in 100 to 120 days. For the government, the benefit of the weaner system is that it releases grazing resources for the breeding herd. As the herd composition changes from 40 percent cows (under the oxen system) to 60 percent cows (under the weaner system), the number of calves produced will increase. This in turn will increase the national herd to the government's target of three million head, and result in more beef being produced.

The BMC promotes the weaner system because it not only increases the number of cattle available for slaughter but also reduces fluctuations in supply; farmers in the traditional extensive grazing systems all tend to sell animals at the same time, often when the animals are in poor condition (i.e. when a drought has started). In addition, feedlotting improves the quality of beef produced and hence more meat that meets high quality standards is produced.

Picture 14: Half carcasses at the BMC

The BMC initially provided capital to farmers with handling facilities and water sources for the purchase of animals and feed (low interest pre-financing). Feed suppliers under this scheme were paid directly by BMC but the farmer was responsible for transporting the feed to the feedlot. The animals purchased were branded with the BMC brand so that the farmer could sell only to the BMC. After finishing the animals, the feedlotter sent the animals to the BMC for slaughter. The

BMC then graded the animals and deducted the amount that was advanced and paid the farmer whatever surplus remained.

This so-called Large Scale Feed Advance Scheme had only a limited uptake. In 2010, for example, there were 40 beneficiaries of the scheme; together, these supplied 15 to 1,350 finished cattle out of a total of around 8,000 animals purchased by the BMC, i.e. less than 5 percent of the animals purchased.

In 2008, faced with stiff competition from municipal abattoirs and other processors, the BMC started to operate a direct cattle purchase scheme (DCP), through which it purchased weaners directly from farmers.[70] This increased demand and prices for weaners to the point where it became more profitable for farmers to sell weaners rather than oxen. Under the DCP, the BMC initially purchased all kinds of cattle, not only weaners. Cattle that are not ready for slaughter because they are too lean or still young are sent to contracted feedlots for finishing. Most of these contracted feedlots are situated near the BMC abattoirs in Lobatse and Francistown. The contracted feedlotters do not own the animals and hence do not face risks associated with cattle mortality. The feedlotters charge a commission on the feed cost and a standing charge for the animals (yard fee). Since 2011, realising that farmers were selling their weaner heifers, which potentially eroded the breeding herd and undermined the objective of increasing the national herd, the BMC started buying only male animals meeting EU requirements under the DCP.

In addition to the feedlot operations under the BMC's feed advance scheme and the DCP, there are a few large private feedlot operations (at least one of which finishes around 20,000 cattle per year) that mostly sell to the BMC and/or other modern processors such as Senn Foods and Quality Meats. Based on BMC and key informant data, we estimated that in 2010 around 100,000 head of cattle moved through feedlots (of which 55,000 head were under the DCP programme).

Animals gain weight and condition quickly in feedlots. The feedlot system feeds total mixed rations, usually based on grain by-products, to weaners (200–240 kg live weight) or long weaners (300 kg live weight), bringing weaners up to slaughter weight (480 kg) in 100 days and long weaners in less time. Feedlotting increases weight, but also improves carcass conformation, grading and fat cover, leading to a higher price per kilogram and more kilograms per carcass. A key issue to consider is how consumers respond to this beef production system.[71]

In the past some of the larger ranches had their own feedlot, but feedlot capacity increased rapidly under the new BMC procurement strategy. By 2011, there were 20 registered feedlots, of which 14 fed animals on their own account and six were contracted under the DCP to feed BMC-owned animals from weaner to slaughter weight and condition. Table 18 provides an overview of the six feedlots under BMC contract, indicating the number of animals they fattened over the last three years under the DCP. In 2010, in addition to the 54,000 animals from DCP feedlots, the BMC purchased 21,000 animals from private feedlots and around 8,000 animals from feedlots benefitting from the feed advance scheme (total of 83,000 feedlot animals).

Feedlotting requires on average 10–12 kg of feed per animal per day, or 1,000–1,200 kg/animal over a 100–day growth cycle. However, the breed has big impact on the daily growth rate of the animals with large differences between traditional breed animals and cross-breed animals. Even for the latter, better genetics can mean a growth rate of 2 kg/day (three-way cross) vs. 1.6 kg/day

[70] Starting in 2007, the BMC opened district offices to facilitate this procurement from farmers (GoB 2011).

[71] For example, higher-income consumers may be willing to pay a premium for grass-fed beef for reasons related to animal welfare, environmental conservation, taste and health.

Table 18: Number of cattle passing through feedlots operated under the direct cattle purchase scheme, Botswana, 2009–2011

	Lobatse feedlots					Francistown feedlot	
Year	Aob	Betta Beef	Hurvitz	Tholo	Walgreen	Inchwe	Total cattle
2009	4535	8267	9292	8022	172	506	30,794
2010	14607	11256	11394	8301	1367	7367	54,292
2011	684	3981	1690	1889	1089	12	9,345[72]
Total	**19826**	**23504**	**22376**	**18212**	**2628**	**7885**	**94,431**

Source: Data provided by BMC.

(Brahman cross). The impact on profitability is great. Total 2011 feedlot capacity of the six feedlots in Table 18 was 150,000 animals per year; thus, at full capacity they would require 150,000 to 180,000 tonnes of total mixed feed per year, just for the six feedlots contracted by the BMC.

This feed is composed of straw, grain and a premix, nearly all of which are imported, making feedlotting a risky undertaking if there are no large feed stock in the country. This riskiness was shown when an FMD outbreak in 2011 in South Africa led to a temporary ban on the import of straw and other feed components from South Africa, which is the main supplier for these inputs.[73] Feedlotting is also a production model that, especially in Europe, is associated with negative effects on animal welfare and the environment. Namibia's FAN Meat standard states that not more than 30 percent of the food an animal eats over its lifetime can be derived from non-pasture sources.

The profitability of feedlots in grain-deficit countries like Botswana is very low. Malope *et al*. (2007) found that gross margin per head was BWP118.00, while net profit was BWPP48.00. The cost of feed and weaners represents over 80 percent of costs for the feedlot (Malope *et al*. 2007, BEDIA 2007). The profitability of feedlotting thus largely depends on the cost of weaners, the cost of feed and the selling price per kilogram live weight of animals sold. Given the high volatility of these three prices, feedlotting is risky. For example, profitability was seriously undermined when the latest FMD outbreak in Zambia forced Batswana feedlotters to procure heat-treated feed from South Africa. This increased the cost of feed from BWP1,300 (US$203)[74] to BWP3,000 (US$467) per tonne. Feed imports from Zambia have since restarted. Botswana's feed-cost challenge may have to be addressed in broader SADC region context (Cumming et al. 2010). Trade modalities based on regional collaboration could leverage the feed-production resources of countries such as Angola, Tanzania and Zambia with the technical and management expertise in livestock production of Botswana, Namibia and South Africa.

The high exposure to feed and cattle price risks at the feedlot level implies that feedlot operations are mainly restricted to situations in which the markets (and prices) are well known in advance and are more rewarding. This is the case in the more-modern channels within the value chain (exports, supermarkets in Botswana) and feedlot operations are thus mostly geared towards these markets and involve tighter vertical coordination (contracts, vertical integration).

[72] Until 31 August 2011. This low volume is due to the FMD outbreak and Botswana's exclusion from the EU market.

[73] During these feed import bans, workers were sent into the bush to cut dry grass and bring it in bulk to the feedlots.

[74] Based on a US$:BWP ratio of 1:6.42 (oanda.com – 1/07/2011).

Feedlots in Botswana are important sources of slaughter animals for the EU market and they have to comply with EU requirements concerning the use of antibiotics (individually registered per animal and as little as possible), hormones (banned) and other growth promoters (banned).[75] In contrast, the use of these substances is not banned on the South African market; as such, it would be difficult for Botswana to compete (at least on price) on the South African market against beef produced using such substances, the more so because Botswana has to purchase most of the feed and fodder for its feedlots on that same South African market and on other markets, with considerable additional costs related to trader margins, transport, losses and handling.

6.5 Profitability of the different production systems

This section assesses profitability using stylized farm examples and assumptions based on key informants and secondary data. As such it is intended to be illustrative in nature and aims to provide: (1) an initial indication of profitability; and (2) a farm-level tool to test strategies that impact the assumptions/profitability. The models do not reflect actual profitability levels based on extensive farm survey/measurement data. It appears from stakeholder review that the assumptions used in the examples are perhaps on the pessimistic side (e.g. in terms of calving rate under the advanced model). Further in-depth research (farm-level measurement) is needed to develop more conclusive insights.

Calculating profitability in the livestock value chain is challenging at the individual operator level and even more so at the level of the system as a whole. The productivity, value-added and riskiness of the system are influenced by many factors, including calving rate, mortality, weaning weight, growth rates on pasture and on feed, feed costs, meat quality and differentiation in the retail market. Essentially, the productivity of the system depends on the efficiency with which the system can convert inputs into outputs. The cost in pula per kilogram of live weight produced may be lower in an oxen system than in a weaner/feedlot system. Given that the oxen system produces smaller-framed animals, slaughter cost per kilogram is higher, but this is offset by the lower production cost, resulting in higher overall value creation. At the same time, the weaner/feedlot system has a larger throughput volume, which could lead to higher aggregate profits even if profit per head is lower. This calculation is complicated by the fact that farms sell into a multitude of channels and operate a variety of management systems.

The profitability of beef production under various production systems has not been extensively studied in Botswana. BIDPA (2006) conducted a study on the profitability of beef production using gross margin analysis. The findings of this study were inconclusive, in that it found that beef production was profitable under only certain conditions in both the commercial and the communal sector. Gross margins are positively correlated with herd size and annual rainfall. For instance, the data used in the BIDPA study were for a drought year; gross margins were negative because of higher feed costs incurred as farmers tried to prevent their animals from dying and hence spent more on feed than they received from cattle sales. In addition, some cattle died as a result of the drought. In some years, some smallholder communal farmers may not sell any animals, resulting in negative gross margins in those years. Cattle-related revenues from sales other than offtake for slaughter also influence profitability (e.g., sour milk sales). For example, the study found that farms that sold bulls as breeding stock were able to increase their profits substantially relative to those that did not sell bulls.

The primary purpose of this section is therefore to estimate the profitability of various types of beef production practised in Botswana's beef sector using stylized examples. It specifically investigates profitability based on standard assumptions and then assesses (to a degree) the sensitivity of profitability to those assumptions. In order to undertake this, enterprise budgets have been

[75] Not using growth stimulants limits the daily gain of the animals and hence especially affects profitability in feedlotting.

developed for various enterprises for each beef production system. Farm gross (and net) margins are computed as total revenue accruing to the enterprise less variable (and total) expenses incurred by the enterprise. The gross margins calculations here are not based on extensive farmer surveys (which are beyond the scope of this study), but are presented as illustrative tools for assessing profitability at the farm level, for assessing the tradeoffs involved with various production decisions and opportunities for improvement, and for comparative analysis with benchmark competitors in follow-on studies. The spreadsheets produced for this part of the analysis were custom-made. There are also some more generic models available for conducting this analysis.[76]

Enterprise budgets have been estimated to determine profitability of the communal sector. In interpreting the discussion that follows, it is important to bear in mind that actual costs and returns from beef can vary significantly depending on location, investments in fixed infrastructure, management skill, scale of operation and many other factors. While every effort was made to cover a broad spectrum of management possibilities and ensure the analysis provides as reliable a picture of current costs and profits as possible, differences in livestock growth rates, distances to market, costs of borehole operation, feed conversion ratios, dressing-out percentages and other variables can each have an important bearing on producer profits and trade competitiveness. The quantitative results should therefore be interpreted as only indicative of value-chain costs and returns and would benefit from a careful review by national experts to validate the findings and test a wider range of management assumptions than could be considered in this study.

6.5.1 Farm-level analysis

The farm-level analysis is structured around three sizes of production unit (20 cows, 80 cows and 130 cows) under basic, improved and advanced management (Table 19). The 20- and 80-cow models are based on farmers operating on an unfenced cattle post in a communal area; the 130-cow system is based on 6 × 6 km fenced ranch using leasehold land. All farmers are assumed to produce according to their personal objectives and resource limitations. This approach of looking at a spectrum of approaches is designed to give a broad indication of current costs of and returns from cattle production and where the greatest gains from intensification could be realized.

Table 19: Types of enterprises analysed, Botswana

Farm level (hardveld, non-FMD area)	Basic	Improved	Advanced	Standing herd[77]
20-cow cattle post	X	X	X	44–55
80-cow cattle post	X	X	X	174–219
130-cow 6 × 6 km ranch	X	X	X	283–355

The template used for the analysis was designed to give an average picture of the annual costs and returns from beef with zero real growth in livestock numbers. In this regard, it is important to bear in mind that the actual numbers of livestock sold as well as spending on recurrent inputs including vaccinations, salt licks and acaricides in any given year can be very different from the long-term

[76] For example: (1) http://www.mla.com.au/Publications-tools-and-events/Tools-and-calculators/Cost-of-production-beef; and (2) www.printlims.org/studies/vaims_value_adding. For the latter see also Spies *et al*. (2009).

[77] The standing herd is based on the dynamics reflected in the template. The production units of the indicated number of cows will lead to these herd sizes based on the assumptions made. The range reflects the various management levels.

picture presented here depending on actual birth patterns, ages of individual animals and farmer preferences, among other factors.

The template is constructed around a number of driving cells in which users first specify the number of cows in the breeding herd, followed by other key management assumptions that affect the calculation of financial costs and returns for each of the three management levels analysed on that spreadsheet page. Other than the total number of cows, these driving assumptions relate to the age of culling, use of bulls and percentage of male calves sold to a feedlot.[78] The driving assumptions used for this analysis are summarized in Table 20. By entering new values in the spreadsheet template, any of these variables could easily be changed to test the impact of new underlying assumptions.[79]

Table 20: Driving assumptions, farm-level analysis, Botswana

	Assumption
Male calves sold to feedlot	60%
Age at which cows are culled	10 years
Replace cows with own stock	100%
Age at which bulls are culled	5 years
Replace bulls with own stock	0%
Number of cows per bull	25

After defining the basic parameters of the analysis, the analyst then enters other assumptions related to the production (calving rate, mortality etc.), annual offtake (percentage and live weight of animals sold at various ages), output and input prices and quantities of inputs used for each management level. Details of the management assumptions used for this analysis are given below.

Picture 15: A cattle lick sold in Botswana

Structure of the analysis

The analysis is based on prices and management practices that are common in hardveldt areas within about 300 km radius of Gaborone or Lobatse. Cattle in the hardveldt typically require more attention to tick control than do cattle raised in the sandveldt. On the other hand, input prices tend to be somewhat lower in areas near to urban centres than in more remote locations. Since the analysis is based on production in the south of Botswana, no cost has been included for vaccination against FMD, which is endemic only in the north.

The 20- and 80-cow models here are based on the CPA system. Under this system, cattle are grazed in unfenced areas around one or more boreholes operated by a syndicate of farmers. Each owner that uses the borehole will normally have their own kraal (corral), where their animal handling

[78] As indicated in Section 6.4, BMC feedlots in Botswana do not accept female animals.

[79] The spreadsheet tool is available on the CD-ROM attached to this report.

facilities, including water troughs and feed troughs (if any), are located. These kraals may be either immediately adjacent to the borehole or up to about 1 km away. CPA farmers sometimes have a far larger herd than the 80-cow system modelled here and, especially in remote areas, may operate their own borehole rather than using a borehole operated by a syndicate.

The analysis of the 130-cow production system is based on farmers operating on a 6 × 6 km (6×6) ranch (i.e. 36 km^2 total area) using leased land that is fully fenced.[80] Ranches can be far larger than the 6×6 system modelled here but differ primarily in scale rather than in underlying management practice.[81]

Management levels

Bearing in mind that all cattle owners make their own management decisions based on their personal objectives and resource constraints, the farm-level analysis of the 20- and 80-cow CPA system and 130-cow 6×6 ranch is structured around three indicative management levels whose main characteristics may be summarized as follows:

Basic. This level represents the type of practices followed by most farmers in Botswana who use few inputs. All government vaccinations are applied at the recommended level, but private vaccinations are given at only 90 percent of the recommended dose. No money is spent on tick control, deworming or supplemental licks. With this level of care, it is assumed that the calving rate is 45 percent and that calf mortality before weaning is 15 percent.

Improved. This level represents the type of modest improvement most farmers could realistically make. All government vaccinations are applied at the recommended level, and private vaccinations are given at 95 percent of the recommended dose. Livestock are treated with acaricides 24 times per year, and deworming is carried out at half dose (i.e. every other year). Moreover, each animal in the standing herd gets half a bag (25 kg) of dicalcium phosphate and half a bag of salt per year as supplemental licks. At this level, the assumed calving rate is 55 percent and calf mortality before weaning is 12 percent.

Advanced. This level represents the type of very good practices farmers could follow by using most available inputs and recommended procedures. Government and private vaccinations are given at 100 percent of the recommended dose, cattle are treated with acaricides 36 times per year, and deworming is carried out once per year. In addition, each weaned animal in the herd receives two full bags of specially formulated salt lick balanced for summer and winter months, which is about half the amount recommended by sellers of these products for "best growth results". At this level, it is assumed that calving rate is 65 percent and calf mortality before weaning is 9 percent.

The key variables for each management level are summarized in Table 21. The dressing-out percentage (CDM divided by live weight) improves with better management as a result of the enhanced nutrition and care of the animals.

[80] Not all 6×6 ranches are fully fenced in which case the system does not bear the depreciation cost of fencing.

[81] There is a lack of surface water, and a dependence on deep boreholes for providing livestock drinking water. Research has shown that boreholes should not be located any closer than 8 km from one another, in most areas of the country (Burgess 1997). This means that the smallest feasible ranch size in such areas is 8km by 8km in extent.

Table 21: Farm-level analysis, key management variables, Botswana

	Basic	Improved	Advanced
Calving rate (%)	45	55	65
Calf mortality before weaning (%)	15	12	9
Dressing-out percentage	49	52	54

Marketing assumptions

This analysis assumes that livestock are sold at a rural buying point near to the cattle post or ranch. In the template, the analyst must specify the percentage of animals sold at various ages (i.e. percentage of weaners sold to a feedlot at 18 or 24 months; percentage of remaining male calves sold for slaughter as a 36-, 48- or 60-month steer; percentage of female calves sold to other farmers as a 24-month in-calf or empty heifer, or for slaughter as a 36-, 48- or 60-month cow). Details of these assumptions are given on the spreadsheet templates. For each type of animal sold, the live-weight assumptions shown in Table 22 were used to calculate total mass and gross revenue.

Based on differences in breeding rate, calf mortality before weaning, numbers of animals sold at different ages and assumed live weight of animals entered by the analyst, the spreadsheet template calculates the total number of head sold in an average year and total live weight and CDM sold. The results based on the assumptions used for this analysis are summarized in Table 23.

Table 22: Live-weight assumptions for finished farm product (kg per head), Botswana

	Live weight (kg/head		
	Basic	Improved	Advanced
18-month weaner (0 teeth)	240	260	280
24-month steer (2 teeth)	285	305	325
36-month steer or cow (2 teeth)	380	400	420
48-month steer or cow (4 teeth)	410	430	450
60-month steer or cow (6 teeth)	460	380	500
Cull cow (full mouth)	480	495	510
Cull bull (6 teeth)	540	550	560

Table 24 summarizes the live-weight price assumptions used for this analysis. These prices are based on the field purchasing prices published by the BMC for a hardveldt area within about 300 km of Gaborone. The current prices used for the base analysis came into effect on 12 March 2012. Across all grades, the new prices represented a reduction of about 19.4 percent from previous levels. BMC marketing executives explained that the change is not because of the loss of the EU export market but the result of a fall in regional export parity. To demonstrate the effects of this price reduction for farmers, a sensitivity analysis was carried out using the previous price.

Table 23: Total annual sales of livestock by management level, Botswana

	Total head sold (all types)	Total mass sold (kg live weight)	Total mass sold in CDM equivalent*
Cattle post (20 cows)			
Basic	7.90	2,884	1,413
Improved	10.07	3,667	1,907
Advanced	12.38	4,579	2,473
Cattle post (80 cows)			
Basic	31.61	11,536	5,652
Improved	40.27	14,670	7,628
Advanced	49.53	18,316	9,890
6×6 ranch (130 cows)			
Basic	51.36	18,745	9,185
Improved	65.44	23,838	12,396
Advanced	80.48	29,763	16,072

*Before fattening of feedlot animals.
Source: authors.

Table 24: Live-weight price assumptions, Botswana

	Live-weight price at rural buying point (BWP/kg)	
	Current base prices	Previous price
Sales to feedlot		
18-month weaner (0 teeth)	9.50	11.25
24-month weaner (2 teeth)	8.50	10.25
Sales to abattoir		
36-month steer or cow (2 teeth)	8.50	10.25
48-month steer or cow (4 teeth)	8.50	10.25
60-month steer or cow (6 teeth)	8.25	10.00
Cull cow	7.50	8.25
Cull bull	7.50	8.25

Analysis of base prices

The financial results for farmer costs and profits at current base prices are summarized in Table 25.[82]

The most immediately striking finding is that cattle production appears less profitable at the improved and advanced management levels than under low-input, basic management. Many cattle owners and other sector experts met during data collection explained that most farmers use the minimum amount of inputs possible and the results here suggest there is good reason for this. Simply put, the increases in output under improved and advanced management are not large enough to justify the additional costs. This is particularly true with respect to advanced management where costs are especially high due to the use of specially blended licks that sellers say are formulated for optimal cattle growth. As indicated, however, the high cost of these inputs relative to increased production may be prohibitive and are likely to provide a financial loss.

Viewed more positively, the data also suggest that important economies of scale can be realized by increasing herd size. In per cow terms, for example, the owner's gross margin is better with an 80-

[82] Tables with results in US dollars are given in Annex 6.

cow herd than with a small 20-cow herd at all management levels and better still with a 130-cow herd under basic and advanced management, but not under improved management (Table 25). This suggests that policies designed to help farmers increase their herd size could be a useful part of a strategy for increasing the competitiveness of beef production.

The analysis also shows that there is a relatively large difference between the gross margin and total profits for the 130-cow 6×6 production system compared with the two unfenced cattle post systems. This is because of the additional capital recovery cost for fencing a 6×6 ranch. Fencing is estimated to cost BWP271,000–BWP362,000 (US$38,700–US$51,600) for a new installation including paddock fences and gates or BWP22,000–BWP25,500 (US$2,700–US$3,600) per year in capital recovery terms.

Table 25: Farmer costs and profits from cattle production at current base prices, Botswana

System/ management level	Gross revenue	Farmer's variable costs	Farmer's total costs ex herd	Farmer's gross margin	Farmer's total profit (loss) ex herd	Farmer's gross margin per cow	Farmer's total profit (loss) ex herd per cow
	---------- BWP/year ----------						
Cattle post (20 cows)							
Basic	23,441	21,572	23,059	1,869	382	93	19
Improved	30,078	29,705	31,495	373	(1,416)	19	(71)
Advanced	37,821	53,950	56,012	(16,129)	(18,192)	(806)	(910)
Cattle post (80 cows)							
Basic	93,763	48,238	52,456	45,524	41,307	569	516
Improved	120,313	78,562	83,597	41,751	36,716	522	459
Advanced	151,283	173,226	179,021	(21,943)	(27,737)	(274)	(347)
6×6 ranch (130 cows)							
Basic	152,365	91,136	117,305	61,229	35,060	765	438
Improved	195,509	178,264	208,233	17,245	(12,724)	216	(159)
Advanced	245,835	295,681	329,459	(49,846)	(83,624)	(623)	(1,045)

Table 26 presents the total costs, including all farm-level costs plus the cost of government vaccinations, borehole development and value of the standing herd, and net profits. The total profits from cattle are much less attractive in these terms. Although Table 25 showed that cattle producers earn a positive gross profit and are generally able to cover their own capital investment costs in fencing and animal handling facilities, at least under basic management, the estimated profits from beef become sharply negative for all herd sizes and management levels once the capital recovery value of the standing herd and all other expenses are taken into account. In this regard, it appears that cattle owners would do better (at current prices) if they were to sell their herd and put the money to work elsewhere rather than stay invested in beef.[83]

[83] The net profit including the herd incorporates the opportunity cost of the return on the capital invested in the herd, assuming a return of 3 percent could be realized by investing this capital elsewhere.

Table 26: Total costs, including government vaccinations, borehole development and value of the standing herd, and profits from cattle production at current base prices

System/ management level	Gross revenue	Botswana's total costs ex herd	Botswana's total costs including herd	Botswana's total profit ex herd	Botswana's net profit including herd
	---------- BWP/year ----------				
Cattle post (20 cows)					
Basic	23,441	26,531	37,689	(3,090)	(14,248)
Improved	30,078	34,982	46,140	(4,904)	(16,062)
Advanced	37,821	59,516	70,674	(21,695)	(32,853)
Cattle post (80 cows)					
Basic	93,763	56,237	99,967	37,525	(6,204)
Improved	120,313	87,441	131,171	32,872	(10,858)
Advanced	151,283	182,928	226,658	(31,645)	(75,374)
6×6 ranch (130 cows)					
Basic	152,365	131,452	203,526	20,912	(51,162)
Improved	195,509	222,481	294,555	(26,972)	(99,046)
Advanced	245,835	343,811	415,885	(97,975)	(170,049)

Table 27 shows the various per-unit cost and profit measures and rate of return indicators calculated by the spreadsheet template for each management variation. The indicators of gross margin and total profit per kilogram live weight and CDM-equivalent will be used to compare farm-level costs and profits with those for other value-chain stages (see Section 11.2.2). With respect to rates of return indicators, the results are mostly very poor. This is especially true for the 20-cow cattle-post system, where the basic management level returns a gross profit of only BWP 0.09 for every pula spent on annual inputs. Farmers would normally hope for a gross profit of greater than 0.50 and this level of return is achieved by only the 80-cow cattle-post system with basic or improved management and the 6×6 ranch with basic management.

Sensitivity analysis of previous price range

Table 28 summarizes the results of a quick sensitivity analysis that looked at the impact of the recent price reduction announced by the BMC (see Table 23 for details of the specific price assumptions and Annex 5 for the full set of financial indicators at both price levels). Although the price reduction was described as the result of changes in regional export parity, Botswana is clearly under pressure from the recent loss of the lucrative EU export market, suggesting that further price reductions may be needed if shipments to the EU market do not reach sufficiently high volumes.[84] Across all grades and types of animals, the new prices represented a drop of about 19.4 percent from the previous level.

[84] Since late 2006, the BMC (and by extension other cattle buyers) has been paying farmers a regional export parity price based on prices paid by the South African Red Meat Abattoir Association (RMAA) and using a formula that was not provided to the authors. In practice, however, there are many important differences between the South African and Botswana meat industries, not least of which is that Botswana has until recently enjoyed EU market access whereas South Africa has not. Moreover, South Africa allows the use of growth hormones in feedlot beef, making the animals cheaper to produce than in Botswana, where growth hormones are prohibited. Most buyers who compete with the BMC have little choice but to follow the BMC's price lead, either for animals going to a feedlot or for direct slaughter. Because the BMC requires cattle to be booked into the abattoir for a specific slaughter date and can sometimes take a week or two to process payment, independent abattoirs with more flexible slaughter schedules that pay cash on delivery typically offer BWP2–3 (US$0.28–US$0.42) less per kg in CDM terms.

Table 27: Costs and returns from cattle production per unit at current prices, Botswana

System/ management level	Farmer's gross margin per kg live weight sold	Farmer's gross margin per kg CDM-equivalent*	Botswana's total profit (ex herd) per kg live weight sold	Botswana's total profit (ex herd) per kg CDM-equivalent*	Farmer's rate of return (gross margin/ variable costs)	Botswana's rate of return ex herd (total profit/total costs)
	---------- BWP/year ----------					
Cattle post (20 cows)						
Basic	0.65	1.32	(1.07)	(2.19)	0.09	(0.12)
Improved	0.10	0.20	(1.34)	(2.57)	0.01	(0.14)
Advanced	(3.52)	(6.52)	(4.74)	(8.77)	(0.30)	(0.36)
Cattle post (80 cows)						
Basic	3.95	8.05	3.25	6.64	0.94	0.67
Improved	2.85	5.47	2.24	4.31	0.53	0.38
Advanced	(1.20)	(2.22)	(1.73)	(3.20)	(0.13)	(0.17)
6×6 ranch (130 cows)						
Basic	3.27	6.67	1.12	2.28	0.67	0.16
Improved	0.72	1.39	(1.13)	(2.18)	0.10	(0.12)
Advanced	(1.67)	(3.10)	(3.29)	(6.10)	(0.17)	(0.28)

* Before fattening of feedlot animals.

Table 28: Sensitivity analysis of previous price range, current and old prices, Botswana

	Gross revenue		Farmers' gross margin		Botswana's total profit (ex herd)		Change as result of new prices
System/ management level	Old prices	Current base prices	Old prices	Current base prices	Old prices	Current base prices	
	---------- BWP/year ----------						
Cattle post (20 cows)							
Basic	27,397	23,441	5,825	1,869	866	(3,090)	(3,957)
Improved	35,306	30,078	5,600	373	323	(4,904)	(5,228)
Advanced	44,525	37,821	(9,426)	(16,129)	(14,992)	(21,695)	(6,704)
Cattle post (20 cows)							
Basic	109,589	93,763	61,351	45,524	53,352	37,525	(15,827)
Improved	141,223	120,313	62,661	41,751	53,782	32,872	(20,910)
Advanced	178,099	151,283	4,873	(21,943)	(4,829)	(31,645)	(26,815)
6×6 ranch (130 cows)							
Basic	178,083	152,365	86,947	61,229	46,630	20,912	(25,718)
Improved	229,487	195,509	51,223	17,245	7,006	(26,972)	(33,979)
Advanced	289,411	245,835	(6,271)	(49,846)	(54,400)	(97,975)	(43,575)

The recent price adjustment will have a significant impact on farmer revenues and profits (Table 28). Whereas all the production systems post significant gross losses under advanced-level management at current prices, the 80-cow cattle-post system was actually profitable at the advanced level before the price reduction. Similarly, total profits to Botswana (excluding the

capital recovery value of the herd but including all other long-term investments and cost of government vaccinations) were positive under basic and improved management before the price reduction, but have become unprofitable at the new level.

6.5.2 Feedlot-level analysis

Most feedlot operators in Botswana work on commission for the BMC or other commercial abattoirs. There are currently 20 commercial feedlot operators in Botswana that raise weaners and steers to a finished weight of approximately 480 kg in cycles that can last anywhere from 40 to 120 days, depending on the weight of the animals on intake and finishing requirements of the abattoir.[85] In total, a typical feedlot may have from 2,000 to more 9,000 cattle in production at any given time, held in a number of yards. At present, all feed is imported, mainly from South Africa but also with significant amounts, particularly of maize chop, from Zambia. Most large feedlots do their own sourcing and blending of feed ingredients.

Picture 16: View at feedlot operation

Commission-based feedlots

Key elements of a commission-based feedlot operation described by the different firms met for this study may be summarized as follows:

- Operators typically charge a standing fee to the BMC (or other client) of around BWP3.70 (US$0.53) per day plus BWP2.00 (US$0.29) per kilogram of feed consumed.
- Animals enter the feedlot at weights of anywhere from 240 kg to 325 kg depending on age and farm conditions.
- In the feedlot, cattle consume around 3.1 percent of their bodyweight per day and gain an average of 1.8–2.0 kg per day over the feeding period.
- Finished animals typically exit the feedlot at around 480 kg live weight.
- Induction costs including a full range of vaccinations, drenching, ear tagging and bolus reading are around BWP70 (US$10) per animal.
- Feedlotting improves the quality of the beef and dressing-out percentages by around 1–2 percent depending on breed and how the animal was raised on the veldt.
- Depreciation and administrative overheads including repairs and maintenance of all equipment (fencing, troughs, tractors, water-supply systems, administrative buildings, vehicles etc.), office costs and utilities excluding electricity used for borehole operation are around BWP350 (US$50) per animal over a typical feeding period of 114 days.

[85] The EU requires that animals must be held in a fenced area for quarantine purposes for at least 40 days before slaughter if they are to be eligible for import into the EU.

- Feedlot animals consume twice as much water as animals on the veldt (i.e. 80 litres per day compared with 40 litres per day). However, because feedlots use mainly electricity to run their pumps rather than diesel as used on the cattle posts, the cost per head was said to be about the same or about BWP15 (US$2.14) per animal per month (excluding repairs and maintenance, which are counted as part of depreciation and overheads).

All of the feedlot operators interviewed declined to say how much they pay for a typical feed mix, saying this was a confidential part of their business model. Mixed feed is the single largest cost at the feedlot stage and the ability to source feed ingredients at a low price is critical to the financial viability of the operation. Feedlot operators reported that prices of feed ingredients often vary widely from month to month, depending on production cycles in neighbouring countries and availability of surpluses for export. Operators also pointed out that a serious risk to their business is the potential for an outbreak of FMD in a key source country, which can result in the immediate suspension of all feed imports as a measure to protect animal health.

In the absence of reliable price data for feed, the approach taken for this analysis was to work backwards from all the other cost information provided by the feedlot owners to determine how much the operator can afford to pay for mixed feed and still earn a reasonable rate of return. Specifically, one operator said their goal is to earn a net profit of BWP100–BWP200 (US$14.30–US$28.60) per head. On this basis, BWP150 (US$21.42) is taken as the "target" income for this analysis. With an Excel spreadsheet, it is easy to determine how much stock feed would have to cost in order to provide this level of income.

The financial analysis of a commission-based feedlot enterprise is shown in Table 29. The analysis is based on the operator raising cattle in batches of 500 head per cycle over a 114-day period. The calculation of annual costs and returns are based on 3.2 batches per year (i.e. 365 days per year ÷ 114 days per cycle). Because most feedlot operators have more than one batch of cattle in production at any given time, the annual results should not be interpreted as the operator's total costs and profits since this will depend on the overall scale of the operation.

As shown, for a commission-based feedlot operator to earn the target income of BWP150 (US$21.42) per head, mixed feed can cost no more than BWP1.82 (US$0.26) per kilogram. At this level, the net profit per kilogram live weight is BWP0.31 (US$0.04) or BWP0.58 (US$0.08) per kilogram CDM-equivalent.

These results are quite sensitive to price change. If feed costs alone were to increase by only 6 percent, to BWP1.93 (US$0.28) per kilogram, for example, the operation would break even and provide zero profit. On the other hand, a 6 percent reduction in feed costs from the assumed level (i.e. BWP1.71 or US$0.24 per kilogram) would result in a 95 percent increase in profits to almost BWP147,000 (US$21,000) per cycle or BWP294 (US$42) per animal. Compared with all other costs, feed accounts for 83 percent of total costs in the base scenario and this high degree of sensitivity to feed price is not surprising.

Independent feedlots

Apart from small feedlots on some large commercial ranches, there appear at present to be only a couple of feedlots in Botswana that purchase livestock for fattening rather than work on a commission basis as described above.[86] Without having to look at the (private) financial records of these firms, the stylized information on feedlot costs and returns discussed above for a commission-based system can be modified as shown in Table 30 to get an idea for how independent feedlotting compares.

[86] Animals in these feedlots also come from their own commercial ranches.

Table 29: Financial analysis of a commission-based feedlot, Botswana

	BWP per unit		No. of units		BWP per cycle	BWP per year	US$ per cycle	US$ per year
Revenue to feedlot								
Standing fee								
BWP3.70 per head per day x 500 animals x 114 day cycle	3.7	per day	57,000	total days	210,900	674,880	30,129	96,411
Feed costs – charged to client								
BWP2.00 per kg @ 11.5475 kg per head per day	2.0	per kg	658,208	total kg	1,316,415	4,212,528	188,059	601,790
Total revenue due to feedlot					1,527,315	4,887,408	218,188	698,201
Costs to feedlot								
Variable costs								
Induction cost	70.0	per head	500	head	35,000	112,000	5,000	16,000
Feed (cost to operator)	1,820.8	per tonne	658	total tonnes	1,198,464	3,835,085	171,209	547,869
Water (60–80 litres per head per day)	56.2	per head	500	head	28,110	89,951	4,016	12,850
Labour (supervisor)	4,497.5	per worker per cycle	1	workers	4,498	14,392	643	2,056
Labour (general)	2,811.0	per worker per cycle	4	workers	11,244	35,980	1,606	5,140
Total variable costs					1,277,315	4,087,408	182,474	583,915
Fixed costs								
Depreciation and overheads	350.0	per head	500.0	head	175,000	560,000	25,000	80,000
Total costs to feedlot					1,452,315	4,647,408	207,474	663,915
Feedlot profit (loss)								
Gross profit (total revenue − variable costs)					250,000	800,000	35,714	114,286
Gross profit (loss) per head					500	500	71	71
Gross profit (loss) per kg finished live weight (480 kg per head)					1.04	1.04	0.15	0.15
Gross profit (loss) per kg CDM-equivalent (54% dressing out)					1.93	1.93	0.28	0.28
Net profit (gross profit − depreciation and overheads)					75,000	240,000	10,714	34,286
Net profit (loss) per head					150	150	21.4	21.4
Net profit (loss) per kg finished live weight (480 kg per head)					0.31	0.31	0.04	0.04
Net profit (loss) per kg CDM-equivalent (54% dressing out)					0.58	0.58	0.08	0.08

In this analysis, feed costs are held constant at BWP1.82/kg (US$0.26/kg), which was the price found to give a commission-based feedlot the target profit of BWP150/head (US$21.43/head). As an independent operator, however, revenues are not calculated based on standing fees or feed consumption, but against the CDM price (BWP21.00/kg or US$3.00/kg) paid by the processor for finished animals. The other important difference is that the independent feedlotter must purchase the weaners that go into production, if they are not from their own herd.

As shown by this analysis, an independent feedlotter would lose an estimated BPW641 (US$92) per head at the same feed price that was found to give a commission-based operation the target profit. Although total revenue is higher as a result of selling direct to the abattoir, total costs are even greater as a result of having to purchase the animals for fattening, thereby giving an overall financial loss. Even if an independent feedlotter fattens animals from their own herd (thereby saving money on the purchase price), these animals could have been sold elsewhere so still have opportunity-cost value, meaning the financial results shown above still apply regardless of how the animals were acquired. The business-case for such feedlot operations is not their intrinsic profitability, but rather their strategic fit in a conglomerate that has broader business interests, either through vertical integration along the beef chain (feed supply, slaughter) or diversification into other food industries.

Table 30: Financial analysis of an independent feedlot (at base cost of feed), Botswana

	BWP per unit		No. of units		BWP per cycle	BWP per year	US$ per cycle	US$ per year
Revenue to feedlot								
Sale of finished cattle to abattoir								
BWP21 per kg CDM based on 54% killing-out of 500 animals of 480 kg live weight	21.0	per kg CDM	129,600	kg CDM	2,721,600	8,709,120	388,800	1,244,160
Total revenue to feedlot					**2,721,600**	**8,709,120**	**388,800**	**1,244,160**
Costs to feedlot								
Variable Costs								
Purchase of weaners and steers (500 animals of. 265 kg)	12.0	per kg live weight	132,500.0	kg live weight	1,590,000	5,088,000	227,143	726,857
Induction cost	70.0	per head	500.0	head	35,000	112,000	5,000	16,000
Feed (cost to operator)	1,820.8	per tonne	658.2	total tonnes	1,198,464	3,835,085	171,209	547,869
Water (60–80 litres per head per day)	56.2	per head	500.0	head	28,110	89,951	4,016	12,850
Labour (supervisor)	4,497.5	per worker per cycle	1.0	workers	4,498	14,392	643	2,056
Labour (general)	2,811.0	per worker per cycle	4.0	workers	11,244	35,980	1,606	5,140
Total variable costs					**2,867,315**	**9,175,408**	**409,616**	**1,310,773**
Fixed costs								
Depreciation and overheads	350.0	per head	500.0	head	175,000	560,000	25,000	80,000
Total costs to feedlot					**3,042,315**	**9,735,408**	**434,616**	**1,390,773**
Feedlot profit (loss)								
Gross profit (total revenue – variable costs)					**(145,715)**	**(466,288)**	**(20,816)**	**(66,613)**
Gross profit (loss) per head					(291)	(291)	(42)	(42)
Gross profit (loss) per kg finished live weight (480 kg per head)					(0.61)	(0.61)	(0.09)	(0.09)
Gross profit (loss) per kg CDM-equivalent (54% dressing out)					(1.12)	(1.12)	(0.16)	(0.16)
Net profit (gross profit – depreciation and overheads)					**(320,715)**	**(1,026,288)**	**(45,816)**	**(146,613)**
Net profit (loss) per head					(641)	(641)	(91.63)	(91.63)
Net profit (loss) per kg finished live weight (480 kg per head)					(1.34)	(1.34)	(0.19)	(0.19)
Net profit (loss) per kg CDM-equivalent (54% dressing out)					(2.47)	(2.47)	(0.35)	(0.35)

Table 31 provides the results of a simple sensitivity analysis that looked at how much an independent feedlot operator could afford to pay for feed and still earn the same target income as a commission-based operator. This type of "goal seek" analysis is easy to carry out in Excel, assuming all other variables remain unchanged. As shown, an independent feedlot operator could afford to pay no more than BWP1.22 (US$0.17) per kilogram for feed to earn the same target income as the commission-based operator. This is 34 percent less than the price commission-based feedlot operators can afford to pay.

There is a further inherent risk for independent feedlotters of competing with the BMC, whereby a very small drop in CDM prices paid for finished livestock can render the system unprofitable. Independent feedlotters are not required to sell to the BMC (and in fact most sell elsewhere), but the BMC is still the main price setter and a drop of just one pula in CDM price (from BWP21.00 to BWP20.00) would result in a net loss of BWP54,600 (US$175,000) per cycle of 500 animals even using the low (sensitivity analysis) price of feed shown in Table 31.

Table 31: Sensitivity analysis of an independent feedlot (required feed price to give target profit of BWP150 per head), Botswana

	BWP per unit		No. of units		BWP per cycle	BWP per year	US$ per cycle	US$ per year
Revenue to feedlot								
Sale of finished cattle to abattoir								
BWP21 per kg CDM based on 54% killing-out of 500 animals of 480 kg live weight	21.0	per kg CDM	129,600	kg CDM	2,721,600	8,709,120	388,800	1,244,160
Total revenue to feedlot					**2,721,600**	**8,709,120**	**388,800**	**1,244,160**
Costs to feedlot								
Variable costs								
Purchase of weaners and steers (500 animals of 265 kg)	12.0	per kg live weight	132,500.0	kg live weight	1,590,000	5,088,000	227,143	726,857
Induction cost	70.0	per head	500.0	head	35,000	112,000	5,000	16,000
Feed (cost to operator)	1,219.6	per tonne	658.2	total tonnes	802,749	2,568,797	114,678	366,971
Water (60–80 litres per head per day)	56.2	per head	500.0	head	28,110	89,951	4,016	12,850
Labour (supervisor)	4,497.5	per worker per cycle	1.0	workers	4,498	14,392	643	2,056
Labour (general)	2,811.0	per worker per cycle	4.0	workers	11,244	35,980	1,606	5,140
Total variable costs					**2,471,600**	**7,909,120**	**353,086**	**1,129,874**
Fixed costs								
Depreciation and overheads	350.0	per head	500.0	head	175,000	560,000	25,000	80,000
Total costs to feedlot					**2,646,600**	**8,469,120**	**378,086**	**1,209,874**
Feedlot profit (loss)								
Gross profit (total revenue − variable costs)					**250,000**	**800,000**	**35,714**	**114,286**
Gross profit (loss) per head					500	500	71	71
Gross profit (loss) per kg finished live weight (480 kg per head)					1.04	1.04	0.15	0.15
Gross profit (loss) per kg CDM equivalent (54% dressing out)					1.93	1.93	0.28	0.28
Net profit (gross profit − depreciation and overheads)					**75,000**	**240,000**	**10,714**	**34,286**
Net profit (loss) per head					150	150	21	21
Net profit (loss) per kg finished live weight (480 kg per head)					0.31	0.31	0.04	0.04
Net profit (loss) per kg CDM-equivalent (54% dressing out)					0.58	0.58	0.08	0.08

Taken together, these results demonstrate the difficult situation feedlots in Botswana currently face. Although the actual costs and returns for individual firms can be very different from those modelled here, each of the operators met during data collection complained of thin margins and said they never know what their profits will be because of the potential for large swings in the cost of feed. The risk of Botswana's borders being closed to feed imports as a result of outbreaks of FMD in South Africa and other neighbouring countries was also identified as a significant risk.

Finally, although uncertainty of actual feed prices makes it difficult to predict actual incomes for feedlot operators, one clear implication of the analysis is that the GoB should be vigilant to ensure that import procedures for feed ingredients are as simple and streamlined as possible. Transaction costs at border posts, including the need to obtain SPS certificates and certificates of quality analysis, can add several dollars to the per tonne cost of imported feed. Efforts to minimize these costs could therefore be an important part of an actionable strategy for improving the competitiveness of the Botswana beef sector.

6.5.3 Summary of main findings

Cattle production is generally profitable in gross terms at the farm level, but not when long-term capital recovery costs are taken into account. This is particularly true when the opportunity cost

value of money invested in the standing herd is taken into account, in which case profits from cattle production are strongly negative.

An important constraint in Botswana is that there appear to be few incentives for farmers to adopt improved management practices. In all cases, the analysis shows that cattle production becomes less profitable as farmers move from basic management to improved and advanced management levels as a result of both the high cost of the associated inputs and the limited gains from higher offtake at current producer prices. While there are no doubt areas for improvement that do provide farmers with more income, this finding shows that Botswana should be especially careful in promoting changes that actually provide cattle producers a financial reward. This finding also points to inherent challenges for Botswana in securing long-term access to the EU and other high-value export markets where consumers demand very high quality beef. Unless Botswana is able to send pricing signals to farmers that reward improved production, targeting high-value export markets may continue to be challenging.

Economies of scale appear to be another important driver of farmer profits: large herds provide better rates of return and generate more profit per head sold than smaller herds. Given the limited carrying capacity of Botswana's rangelands, however, increases in production will be limited by the fact that unimproved management is more profitable than improved management. Better care and supplemental feeding are generally needed to increase herd size on a given grazing area, but use of such inputs are not rewarded at current prices.

Another important challenge highlighted by the analysis is the additional cost of fencing ranches (or any other area of rangeland) to meet new fencing requirements for access to the EU market. During data collection, fencing costs were reported to be around BWP7,450 (US$1,065) per kilometre for a boundary fence and BWP6,850 (US$980) per kilometre for a lighter-weight paddock fence. At these prices, the initial cost of fencing a 6×6 ranch with only four paddocks and a minimum number of gates can easily be BWP270,000 (US$38,700) or more. Assuming a lifespan of 20 years, the annual capital recovery cost of fencing is an estimated minimum of BWP18,800 (US$2,700) for the cattle producer.

The profitability of feedlots is highly sensitive to the cost of feed, as expected. While feedlot operators were reluctant to say how much they pay for a kilogram of feed, estimates here suggest that commission-based feedlot operators could afford to pay no more than BWP1.82 (US$0.26) per kilogram if they are to earn a target profit of BWP150 (US$21.43) per head at the end of the feeding period. If feed prices increased by just 5 percent to BWP1.91 (US$0.27) per kilogram, the estimated net profits for a contract operator would fall by 80 percent to just BWP30 (US$4.30) per head.

Achieving profitability is even more difficult for an independent feedlot operator who purchases livestock to go into the feedlot and is paid by an abattoir based on CDM. Assuming all other costs remain the same as those in the commission-based system, an independent operator could afford to pay no more than BWP1.22 (US$0.17) per kilogram for feed if they are to make the target profit of BWP150 (US$21.43) per head. If the independent operator were to pay the same price for feed as the commission-based feedlot operator (BWP1.82/kg), the independent producer would lose an estimated BWP641 (US$91.63) per head.

While many other factors influence the actual profits from feedlotting, the finding that independent operators face a significantly more difficult situation than do contract operators (all else being equal) points to an underlying problem with current price structures, whereby there is apparently too little difference in value between weaners/steers and cold dressed meat for feedlotting to be viable as a standalone activity. It appears that unless feed prices are very low, feedlotting is only financially feasible in a more vertically coordinated system, i.e. through commissioned (contracted) or vertically integrated business models whereby the processor pays a higher price per animal delivered in return for higher-quality and a more regular supply of cattle for slaughter.

Many other conclusions besides the few points noted here can be drawn from the detailed summary tables and spreadsheet models prepared for this study. Agricultural administrators, cattle producers, feedlot operators, butchers and meat processors, livestock agents, abattoir operators and other public and private stakeholders in the beef value chain are each likely to interpret the data differently, with an increased emphasis on their particular area of concern. Bearing in mind that our analysis is not intended as a comprehensive financial modelling of the Botswana beef sector, it is hoped that others will use the enterprise models and spreadsheet templates developed for this study. With these tools, it is relatively straightforward for an agriculture economist or other policy analyst to test the effects of alternative pricing decisions and different input–output assumptions, and doing so would contribute to Botswana's ongoing policy review and formulation process.

7 Processing

7.1 Slaughtering

The BMC is, by far, the largest slaughter house in the country, with three abattoirs. The Lobatse abattoir has a slaughtering capacity of 650 cattle per day, while the Francistown abattoir has a capacity to slaughter 350 cattle per day (Marlow 2009). The Maun abattoir, recently refurbished and reopened, has a capacity to slaughter 100 cattle per day. The combined annual capacity of the BMC abattoirs is thus around 286,000 cattle per year,[87] and they are expected to operate at 85 percent capacity (i.e. a minimum of 240,000 animals per year). Despite its privileged position, the number of cattle supplied to the BMC declined from about 70 percent of capacity in the 1980s to about 40 percent in 2005 (Abelprojects 2006) but have since increased again under the weaner production system and the new cattle pricing structure to reach 63 percent in 2010. Although data were not available to the authors, the dramatic events of 2011 (FMD outbreak, exclusion from the EU market) most likely reversed this trend (at least temporarily).

Picture 17: A rural slab butchery

The decline in the number of cattle supplied to the BMC was the result of reduced economic incentives for farmers, but also of farmers responding to the increase in demand on the domestic market, a market the BMC chose to largely ignore to focus on the more lucrative export markets, especially the EU. Other beef processors and the municipal and private abattoirs and rural slaughter slabs that supply butchers have processed ever-growing volumes in response the growing demand on the domestic market. In the domestic market channel, a distinction needs to be made between rural and urban areas. In the rural areas, most meat is sold as bone-in at a standard price per kilogram, irrespective of the cut, whereas in towns customers have specific wishes and are prepared to pay more for preferred cuts, which requires further processing after slaughter by butchers.

[87] Assuming 52 weeks of 5 days.

Municipal abattoirs are owned by their respective municipalities and charge a service fee for slaughtering. There are about 12 municipal abattoirs registered under the DVS (three of which are not operational). Some municipalities, such as Gaborone, do not have municipal abattoirs and hence rely on private abattoirs. Municipal slaughter fees charged are highly subsidized, with fees as low as BWP35 per animal slaughtered in Francistown (Voice Newspaper, 07/10/2011), compared with BWP150/head charged by a rural slaughter slab visited by the authors. The Francistown abattoir was operating at twice its normal capacity (100 versus 45 animals per day) as a result of high demand in the domestic market and its low processing fees, but was closed by the DVS, which cited lack of hygiene because of dilapidated buildings and equipment. In addition to municipal abattoirs, there are around 80 rural slaughter slabs and about seven private abattoirs. The latter include the three BMC abattoirs, as well as the abattoirs used by the smaller meat processing plants focused on the domestic market (Senn Foods, Quality Meats and Jean van Riet). These processing plants normally have dedicated slaughter houses, which they own or lease, and slaughter a range of species including cattle. They then process the meat into various cuts for resale to butcheries, mainly in the supermarkets.

Box 1 - Bones and hides

The domestic market in Botswana prefers in-bone beef, and does not discriminate between prime or cheap cuts, especially in rural areas (Malope and Ransom 2009). However, the export market and to some extent the urban market discriminate prime cuts from cheap cuts. The EU market requires that beef sold be deboned. Deboning removes lymph nodes and material associated with BSE. The urban market debones beef to cuts such as fillets and rump steak in order to meet the demands of the more discriminating urban market and the food-services sector. In the past, bones were used to produce by-products such as bone meal that was used as supplementary feeds. However, such products have been banned by the EU once it was recognised that they could transmit diseases between animal species and human beings.

Hides are either traded directly between the carcass owner and a hide trader who prepares the hides for export, or are accumulated by a local trader who sells to larger trade merchants when he has accumulated sufficient quantity (Abelprojects 2006). The price a fresh hide ranges from BWP30 to BWP60 in Gaborone, depending on quality, which is normally measured by the number of holes a hide has. The BMC abattoir in Lobatse owns a tannery which was used to process hides to "wet blue" stage for export. This tannery sourced the hides from the BMC abattoirs and also performed fee-based processing of hides for other slaughter houses. The Lobatse tannery has a capacity to process 300,000 hides a year to "wet blue," i.e. the entire estimated offtake from the Botswana beef sector.

The DVS, formerly known as the Department of Animal Health and Production (DAHP), plays a central role in beef processing in Botswana. The 2006 Livestock and Meat Industries Act (LMIA) makes the DVS responsible for inspecting all facilities where animals are slaughtered. Before this Act, municipal abattoirs and slaughterhouses were monitored by the municipalities. The Act, which became operational in 2007, requires that all slaughter facilities be registered with the DVS and consolidates the control, supervision and inspection of red-meat abattoirs under the single authority of the DVS. Control aspects include licensing and the power to revoke licences where standards are violated. This Act requires that slaughtering facilities should meet certain requirements and be approved by DVS, and that all carcasses be inspected by the DVS and certified safe for human consumption.

Picture 18: Small beef-processing operation

The LMIA was set up with the main purpose of improving hygiene in local abattoirs to ensure they produce meat that is safe for human consumption. The centralization of the inspection of meat aims to ensure that only wholesome and safe meat is sold to the public. Inspection by the DVS is meant to guarantee an independent meat inspection and carcass grading. Prior to the Act, DVS inspected export abattoirs but city and district council officers inspected local abattoirs using different standards. The changes under the Act were likely set in motion by the arrival in 2004 of the so-called "Hygiene Package" in the EU. This package was the logical consequence of changing the paradigm of food-safety assurance in the 2002 EU White Paper to one where food safety became squarely the responsibility of the value-chain actors and in which governments retained final control, i.e. the "control over the control system".

However, having rules and regulations governing the beef value chain does not mean that they are enforced, and enforcement of the rules and regulations governing the Botswana beef chain has so far not been particularly impressive. The DVS has not been in a position to enforce the LMIA (Malope and Ransom 2009), mainly because of insufficient resources. In the domestic market, cattle continue to be slaughtered in unhygienic places such as on rural slabs and under trees in the bush, without the DVS inspecting carcasses to certify their safety for consumption. In the export market, the DVS was removed from the EU list of approved licensing authorities because of failures in its enforcement of the LITS system and its licensing. This resulted in the DVS suspending Botswana's beef exports to the EU. The way the LITS system has been administered has brought a number of challenges to farmers who wish to sell their livestock to slaughter houses, especially the BMC.

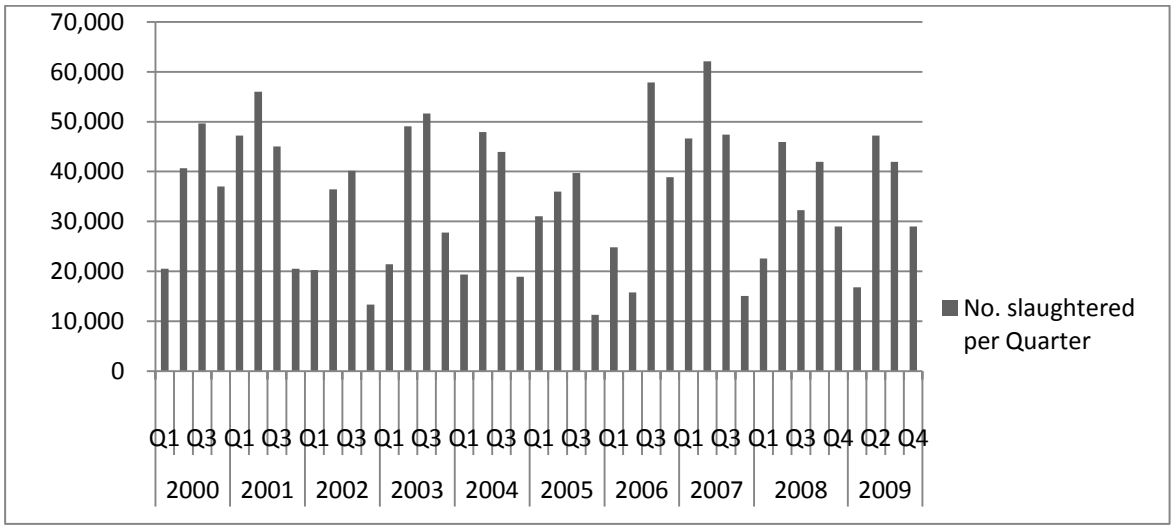
Picture 19: Storage at a small processing operation

A study by Malope and Ransom (2009) shows that, without financial support, many small butchers would not be able to meet the new requirements, which in principle are the same for meat handling facilities for both export and domestic markets. If the DVS were to rigorously enforce standards and shut down all non-compliant abattoirs, small butchers would have to slaughter their animals in approved facilities in towns or rural areas. Although high hygiene standards are needed in any food market, it can be debated whether the same stringent measures should apply for Botswana's domestic market as for the export market. Even the EU itself for a long time had a two-tier system, with different safety measures for products from large meat enterprises and from smaller ones. In practice, given the current shortage of inspectors and the lack of resources available to them, it seems unlikely that all carcasses can be inspected and classified as intended under the 2006 Act. If the additional investments required from butchers cannot generate additional income because the DVS is not able to stop those operators who do not meet the requisite standards, nothing will change. By way of

illustration, 30 percent of the butchers interviewed by Malope and Ransom (2009) still slaughter in the bush ("from a tree").

The number of animals slaughtered shows a seasonal pattern (Figure 16). As a result, slaughterhouses are operating below capacity for at least half of the year.

Figure 16: Number of cattle slaughtered per quarter, Botswana, 2000–2009



Source: CSO (2011).

Cattle offered for slaughter are coming from two production areas with differing characteristics that affect export potential: a green zone and a red zone.The red zone is located in the north of the country where wild buffalo reside, and cattle must be vaccinated against FMD as buffalo are natural reservoirs for FMD. Cattle from the red zone (or unprocessed meat derived from them) are generally not be moved out of the red zone or sold to other countries.[88] The meat is processed locally in the BMC Maun abattoir; once it has been sterilized under high temperature and pressure it can be shipped to various markets.[89]

Cattle in the green zone are not vaccinated against FMD as the disease in not endemic in this zone. As a result, beef from these animals complies with end-market disease requirements and these cattle are processed into chilled or frozen beef for export. There is a buffer zone between the green and red zones.

Under a policy agreed upon with the GoB, the price paid by the BMC to producers in the red zone is linked to the price it pays to producers in the green zone. This price is a set price per kilogram, e.g. BWP14/kg at the time of data collection, or 80 percent of the green zone price, whichever is higher.[90] Cattle purchased by the Maun abattoir in the red zone mostly go into canning, a low-

[88] This is not entirely accurate, as it can be sold throughout Botswana and other places, provided it conforms to certain standards. For example, beef from the BMC's Maun abattoir in the red zone was exported to Angola in late 2011, and live cattle were exported to Zimbabwe.

[89] If deboned and sufficiently chilled and matured, meat from the red zone can be transported to the green zone for high temperature processing.

[90] This price is subsidized with funds from the Cattle Export Levy Fund.

priced beef product. Thus, in effect farmers in the green zone subsidize farmers in the red zone. On the other hand, without the creation of the red zone, the green zone would not have been able to gain access to the lucrative EU market.

7.2 Secondary processing

Secondary processing of beef, i.e. deboning carcasses and cutting into portions and cuts, and further processing (e.g. production of canned beef and sausages) are done by only a handful of registered meat processing plants in Botswana, mainly located in the urban centres. Apart from the BMC, these processors include Senn Foods and Quality Meat and large butcheries such as Gantsi Beef, Afro Butchery and Butcher Shop. These engage in cold storage, cutting and processing. Because of all the handling and increased contact surfaces of the meat (cutting of the carcass, mincing and so on), hygiene is of critical importance in these plants. This starts with the hygiene of the carcass quarters arriving at the plant.

These processors have integrated vertically along the beef value chain and now own cattle farms, feedlots, abattoirs, meat cutting, packing, cold storage and distribution facilities and/or retail outlets (butcheries). Alternatively, they contract feedlots, where they pay for both space and feeding (e.g. BMC, Quality Meat). Some processors have their own abattoir (Senn Foods, BMC), while others rent an abattoir (Quality Meat). Some (e.g. Quality Meat) use modern, intensive-use customized software programmes to track, in real time, cattle flows into and out of the feedlots and through the abattoirs and processing plants, and to track the stock and distribution of products to sales outlets. This allows these firms to track their costs carefully, which in turn facilitates both operational efficiency and price-setting.

At the BMC, deboning and cutting of the carcass quarters is followed by vacuum packaging and boxing for export. Apart from processing meat into deboned beef for export as either chilled or frozen boneless beef, the BMC produces other (secondary) beef products such as ox tongue, stewed steak and corned beef (canned under the Ecco brand) and by-products such pet food. The bulk of these secondary products are sold in the local market. For instance, the BMC supplies the government school-feeding programme with stewed beef. In addition, faced with a limited market during the EU ban, the BMC sold more fresh and frozen meat to the local processing and butchery sectors.

At the larger and more modern processors with their own slaughter facilities, operating exclusively in the domestic market due to legal constraints, the meat is further processed (cuts, polonies, minced beef etc.), packaged as retail-shelf-ready products and sold mostly to the butchery departments of domestic supermarkets. Most of the major supermarkets in Botswana are South African and source most of their products from South Africa, but they source their supplies of beef locally, mainly from the larger meat processors. Although the beef packs sold in most supermarkets in Botswana are labelled, including with a date of manufacturing, they cannot be traced back to the plant where the source animal was slaughtered.

Picture 20: Processing at the BMC

As slaughter in Botswana peaks in the first and second quarter of the year, some meat is vacuum sealed, boxed and stored frozen until it is sold to local butchers and supermarkets in the third and fourth quarters when there is often a shortage of suitable animals for

slaughter. As a rule of thumb these beef processing companies estimate that the cost of the carcasses is 70 percent of the sales price, with the other 30 percent covering labour, working capital cost, depreciation and profit.

7.3 Profitability of beef processing

7.3.1 Profitability of the BMC

Given the complex and opaque structure of the BMC,[91] we did not conduct a detailed profitability analysis. Furthermore, given its unique legal status, the BMC's financial performance is not measured in terms of profits but in terms of returns to producers (surplus above break-even). However, based on the available studies, selected data provided by the BMC and comments from key informants, some key observations can be made.

The (operating) profitability of the BMC has fluctuated greatly over the years, as demonstrated by the latest available figures: a surplus of BWP90 million in 2008 and a deficit of BWP84 million in 2009. BIDPA (2006) observed that BMC's profits declined between 1995 and 2005 despite the fact that the real prices it received for its beef had increased and it had reduced the prices it paid to producers.

A large part of the explanation for this weak performance is the low revenue realized in the various markets, as discussed in Section 4. However, operational inefficiencies play an equally critical role. These inefficiencies range from low throughput relative to capacity, through cattle supplies that are highly variable in terms of timing and quality, to overstaffed and underperforming sales teams in export markets. In addition, there are some issues related to surface water, groundwater and air pollution that negatively impact the BMC's environmental footprint (Parry 2009).

Over the last 20 years the BMC has generally operated far below its capacity of 286,000 head per year. Even though its performance has improved markedly in this respect in recent years, increasing from 40 percent capacity use in 2007 to 63 percent in 2010 (180,000 animals), this was still far below a competitive level (85 percent or more) and almost certainly fell back in 2011 as the BMC lost access to the EU market and had to reduce throughput as a result. The exclusion from the EU market, the 2011 FMD outbreak and ongoing obligations under the DCP created such grave financial problems that in April 2012 the BMC needed an emergency loan of BWP100 million to remain operational (Sunday Standard Online 2012).

Higher throughput would improve operational efficiency, but it is not just an issue of low throughput. Although the BMC operates modern processing plants that de facto comply with the highest global food standards (EU), its operational efficiency is far below the industry average. Marlow (2009) compared the operational performance of the BMC to the benchmarks of Good Beef Processing Industry Practice and concluded that bringing the BMC in line with average industry benchmarks across the board would result in overall annual cost savings of over BWP260 million. This is more than double the BMC's 2010 operating loss of BWP129 million and a quarter its 2010 turnover of BWP1,061 million.

Key findings from the benchmark study include the following:

- During high stock levels (peak seasonal supply) stock turnover was slow, taking about 3–4 times as long as the industry average.

[91] The BMC Group consists of some 10 subsidiaries including insurance and investment firms in the Cayman Islands and Guernsey and storage facilities and sales firms in Germany, South Africa and theUnited Kingdom.

- Overall labour productivity was around one-third of the industry average, largely as a result of overstaffing. The productivity of administrative (non-production) labour was particularly low, only one-tenth of the industry average. This finding created the strategic opportunity to introduce an improved management information system (MIS) that would allow more to be done by fewer staff. An MIS that fully integrates the various functions and subsidiary activities of the BMC would not just improve labour productivity, but would also increase overall efficiency by, for example, improving stock management, financial management and marketing and pricing strategies.

- Moisture loss during cold storage was three times the industry average (3 percent vs 1 percent), while boning yields (kilogram of boneless meat per kilogram of CDM) was 67 percent versus an industry average of 69 percent. Given a throughput of 150,000 head, merely halving the gap between BMC and industry average performance for these two ratios would yield 1,500 tonnes more beef (or BWP45 million at an average sale price of BWP30/kg).

- The BMC's overall processing cost varies markedly from year to year, but in 2009 the overall processing cost (from cattle delivery to product dispatch) was around BWP5.7 per kilogram CDM (or BWP1,175/head). Despite being a marked improvement on cost in 2008, this is 30 percent higher than the industry average of BWP4.3 per kilogram of CDM (BWP874/head) and 68 percent higher than the industry best practice of BWP3.4 (BWP696/head).

The extent of the problems clearly points to the need for a complete overhaul of the BMC, rather than marginal change.[92] This restructuring (and a return to stable profitability) is seen by the GoB as a precondition for a possible privatization of the BMC, which has been discussed since at least 2005 (GoB 2011). Detailed prescriptions for such an overhaul have been available since 2007 (BMC/GRM 2007), but implementation has been slow. The arrival in 2011 of new management that brought with it experience with best industry practices in the beef industry created a new impetus for the restructuring. However, progress was severely hampered by external factors, most notably the exclusion from the EU market and an FMD outbreak, and there likely still exists much room for improvement.

The BMC's legal and monopolistic status and partly politically driven social mission undermine its ability to operate as an efficient business, as illustrated in the following three examples.

1. The requirement imposed on the BMC to purchase all cattle offered to it is a direct cause of the high variability quantity and quality of cattle bought by the BMC and associated low dressing ratios and meat yields, even though quality-based pricing and feedlotting contracts have mitigated this to a degree. The associated core objective of maximizing returns to producers rather than maximizing profits that could be paid to farmers as BMC shareholders creates a difficult and somewhat schizophrenic operating environment for BMC management, whereby any "profit" realized would have to be translated directly into higher prices paid to farmers.

2. At various times in its history, the BMC was "forced" to invest in expanding and upgrading processing capacity more for social than for business reasons – although this was largely done using government grants and loans with favourable conditions. For example, the recently refurbished Maun abattoir, a BWP75 million investment in the commercially less attractive[93]

[92] Based on limited key informant information, it appears that the situation is far less dire for the other processors, which have more control over their supply chain and which are assumed to be profitable and growing.

[93] When the Maun abattoir was offered for sale in 2008, and then for lease when there was no interest from buyers, there was no interest from the private sector. At that time, the BMC board decided that the BMC should invest in refurbishing the abattoir. The BMC board is controlled by the BMC shareholder, the GoB. This was illustrated in April 2012, when the Minister of Agriculture replaced the board in order to address a stalemate between board and management, and two months later replaced management as well.

but socially important red zone, is suffering from operational issues that vary from lack of sufficient storage space to insufficient water supply. It closed down again in March 2011 but reopened in November 2011 with a view servicing exports to Angola.

3. The absence of domestic competition for export markets has reduced the need for the BMC to upgrade its services and innovate and to generally keep up with competitors such as Meatco in Namibia. To a significant degree, the BMC has been able to compete based on its tariff-free entry to the EU market, i.e. on low prices rather than on high product quality.

7.3.2 Profitability of a butcher

The last type of enterprise covered by the financial analysis is a small butchery selling meat and offal to domestic consumers. The costs and returns for a retail butchery can vary greatly depending on the scale of operation, source of meat, losses (including theft), number of workers hired and many other considerations. The model here covers just one level of typical management for a small butchery operation that handles five carcasses per week.[94] Most butchers in Botswana make little if any distinction between cuts of meat and mainly sell meat on the bone, in accordance with local taste preferences. Details of the assumptions and financial results of the butchery analysis are shown in Table 32.

Table 32: Financial analysis of small butchery, Botswana

	Kg/week	BWP/kg	BWP/week	BWP/year	US$/year
Total sales					
Meat (5 × 225 kg carcass per week less 15% losses)	956	31.75	30,361	1,578,769	225,538
Liver (7–11 kg per animal – assume 9 kg avg)	25	28.00	700	36,400	5,200
Tripe (6 kg avg per animal)	30	16.25	488	25,350	3,621
Head (sell each head for BWP30)			150	7,800	1,114
Hoofs (sell each hoof for BWP7)			140	7,280	1,040
Total kg sold, revenue	**1,011**		**31,838**	**1,655,599**	**236,514**
Operating costs					
Carcasses (5 × 225 kg carcass per week, delivered)	1,125	24.00	27,000	1,404,000	200,571
Labour (4 workers @ BWP900 pm)			831	43,200	6,171
Electricity (BWP1,000 pm)			231	12,000	1,714
Plastic bags/consumables (BWP0.15 per kg sold)	1,011	0.15	152	7,888	1,127
Soaps and detergents (BWP150 pw)			150	7,800	1,114
Water (BWP500 pm)			115	6,000	857
Bench saw blade (2 per month @ BWP150 each)			69	3,600	514
Accountancy including prep of VAT returns			58	3,000	429
Telephone (BWP200 pm)			200	2,400	343
Business licence (renewal)			19	1,000	143
Total operating costs (variable costs)			**28,825**	**1,490,888**	**212,984**
Gross profit (loss)			**3,014**	**164,711**	**23,530**
Gross profit per kg CDM sold				3.13	0.45
Gross profit per kg live-weight equivalent (52% killing out)				1.63	0.23
Capital recovery on fixed equipment (see schedule of investment costs for details)					
Total capital recovery cost			1,033	53,705	7,672
Net profit (loss)			**1,981**	**111,006**	**15,858**
Net profit per kg CDM sold				2.11	0.30
Net profit per kg live-weight equivalent (52% killing out)				1.10	0.16
Rates of return					
Gross margin / variable costs				0.11	0.11
Net profit / total costs				0.07	0.07

[94] This appears is in line with our earlier estimates of 100,000 head flowing to 500 butchers (500 butchers × 50 weeks × 5 carcasses = 125,000 head).

At the butchery stage, the analysis shows that a small operator selling meat on the domestic market can expect to generate a pre-tax gross profit of BWP165,000 (US$23,500) per year or around BWP111,000 (US$15,850) in net terms after depreciation on fixed investments. While these profits are likely to make participation in the beef value chain attractive for small entrepreneurs, the high costs of running a butchery, including money spent on purchasing meat, result in very low rates of return and a high element of risk. To compensate for these thin returns, many butcheries aim to source their own meat from local producers and sometimes carry out their own (illegal) slaughters on simple slaughter slabs behind the shop. Further analysis at the butchery level could look at the impact of different cost assumptions for beef and potential benefits from differentiating between high- and low-value cuts.

8 Distribution

8.1 Wholesale distribution

In the domestic market, most fresh beef is sold either through butchers or directly by the processors to retailers. There are cash-and-carry operations in Botswana (e.g. Sefalana) that sell beef to retailers and thus take on a wholesale function. However, given that they have a broad client base and small minimum-purchase volumes, we have grouped them with retailers in this study. True wholesale distribution is therefore at this point really only an element in the export channel. The BMC has three wholesale subsidiaries, one in South Africa (Table Bay Cold Storage Pty), one in the United Kingdom (BMC UK) and one in Germany (Allied Meat Importers GMBH), which are responsible for the wholesale sale and distribution of the product.

These subsidiaries have cold stores in which a strategic reserve of meat is kept in order to be able to fill requests of clients quickly (at least in theory). One of the strong points of the meat exported by the BMC is its long shelf-life of up to six months in chilled conditions.[95] It may become a challenge to maintain this shelf-life as the proportion of animals finished in feedlots increases in the overall kill, because ensuring that these animals do not have a higher bacteria count on their skin surface and in their digestive tract has high requirements in terms of good manufacturing practices and effective audits.

The faltering supply chain discussed above implies that the BMC cannot, generally, supply meat on time year-round according to full specifications (e.g. consistency in portion size) and in the volumes demanded. As such the processor has not been able to secure the premium prices associated with such a value-added product.[96]

Associated with these supply-chain issues, and partly caused by it, the BMC sales arm in the United Kingdom has underperformed in terms of efficiency and revenue generation.[97] One source indicated that this erratic supply chain, combined with a discount-driven sales strategy with little or no optimization on price yield per type of cut (i.e. maximizing the yield per carcass) resulted in discounts of up to GBP3/kg (US$5/kg) on prime cuts relative to beef of similar or even lower

[95] This is due to the fact that a largely oxen-based system typically implies a lower bacteria count on the animals. Frozen beef cuts can be stored for up to two years.

[96] Based on consultant observations and communication with David Falepau, CEO of the BMC in 2011.

[97] That the BMC UK subsidiary operates on a consignment basis rather than on a more performance-based system likely also contributed to the weak performance. The Cape Town subsidiary is far more efficient than the London office and was proposed to become the BMC's centralized global distribution hub (for logistics, not sales) (BMC/GRM 2010).

quality sold in the same market.[98] A more detailed price analysis study commissioned by the BMC found that Botswana's sales prices in the United Kingdom market for the second half of 2010 were below those of all major exporters in almost every product range analysed and did not follow the market trend (Dookie 2011).[99] For this particular time period, it was found that the weak performance was linked to BMC UK putting large volumes of aged stock onto the open market (4–5-month-old stock with only 4 to 8 weeks of shelf-life left). Given that this was at the end of a period when supplies were tight, there is strong indication that the BMC's customer-base is small and that its sales team is underperforming.

The BMC's distribution system is also not cost-efficient, with one study estimating the processor's shipping and distribution costs at 12–14 percent of sales, which is far above the industry average of 4–8 percent (BMC/GRM 2007). This is largely linked to the BMC Group's poorly integrated structure. The BMC does not have a central administration for sales, marketing and market intelligence (BMC/GRM 2007), and market intelligence (general and customer specific) is severely lacking. The BMC head office in Botswana has no strong formal links with its BMC UK office, which makes it difficult to set target prices, develop branding strategies and ensure price-based optimization of carcass break-up. To start addressing this issue, in 2010 the BMC initiated a shift to key account management across its operations (BMC 2011).

Working through an extensive set of subsidiaries for logistics, sales and insurance, as opposed to using open-market service providers or strategic partners, seems to have resulted in costs above market norms. For example, the Table Bay Cold Storage subsidiary charged fees that are around 20 percent above fees charged by other cold stores in the Cape Town area (GoB 2011). Namibia's Meatco dropped the BMC's insurance subsidiary in 2010 when it found that it could buy the same insurance elsewhere for a third of the price.[100]

8.2 Retail

In domestic retailing of fresh and processed beef, three types of retail outlets can be distinguished: rural (village) and urban butchers; supermarkets and cash-and-carry stores (modern retail); and restaurants. These outlets vary both in size and in level of sophistication. The DVS does not inspect beef retail facilities and statistics on the number of the latter could be found by the authors. The number of butcheries is estimated at 500 based on key informants.

Picture 21: Small butchery in Botswana

[98] Dr Jim Barnard, consultant, based on conversations with United Kingdom beef traders who buy from the BMC arm in the United Kingdom.

[99] Prices were roughly 10–15 percent below those of Namibia, and 30–50 percent below those of Argentina and Australia. Price differences were especially marked for higher-quality cuts such as fillets. This represents a loss of over US$10 million per year (given estimated 2010 exports of US$110 million). Further related analysis can be found in Thelwall (2008).

[100] MeatCo had already stopped using BMC UK as its sales agent in 2007.

Picture 22: Supermarket butchery in Gaborone, Botswana

In most rural villages in the country, especially those connected to the national electricity grid, there is at least one butchery, normally part of an independent grocery store. In most cases there is some cold storage, but most customers prefer fresh meat and cooled beef is easily mistaken for defrosted beef. In some parts of the country, individuals still sell meat under a tree with no refrigeration at all. In some rural areas some butcheries still slaughter animals in the bush, while others have simple slaughter slabs on their premises. Most of these butchers source their animals in the neighbourhood, slaughter one to five animals per week and sell the meat off the carcass, without making cuts or price differentiation (Malope and Ransom 2009). Consumers in rural areas also generally prefer bone-in meat and hence little deboning takes place. The bones are normally thrown out with other domestic waste. This suggests that income from bones is higher from selling bone-in beef than from processing bones into bone meal.

In urban centres, however, butcheries and supermarkets use modern slaughter and processing facilities. In towns most people still buy their meat in butcheries, which have an 80 percent share of the BWP705 million domestic beef market (see Annex 3 for the estimation).

Supermarkets and cash-and-carry stores, where meat is sold packaged and labelled in various cuts and price categories, currently represent around 20 percent of beef sales. However, their share is growing fast. Currently, there are five supermarket chains (160 stores) in Botswana: MassMart (owned by Wal-Mart), Spar, Shoprite, Pick'n Pay and Choppies. The last of these is a Batswana chain that has grown rapidly since its establishment in 1986. It has 49 outlets in Botswana that generated grocery sales of BWP2.4 billion in 2010, which represents around 35 percent of the modern mass retail market (Mokgethi 2011). Largely driven by new store openings, Choppies is currently growing by around 20 percent per year, or five times the estimated growth rate of the domestic beef market. It is thus rapidly increasing its share of the market. Choppies has also aggressively expanded into South Africa, where it currently operates nine stores. Its size, growth rate and expanding geographic footprint offer interesting opportunities for the beef value chain. Currently, Choppies beef is supplied through one of its subsidiaries (Safrosh). Other supermarket chains buy from large butcheries or provide concessions to meat processors to operate butcheries in their stores, for example Quality Meat in Pick'n Pay stores (Emongor 2008).

PART III Systemic and sustainability issues

9 Support services

9.1 Inputs

9.1.1 Feed and fodder

There are four main types of cattle-feeding practices used in Botswana besides free access to grazing and browsing: (1) supplementary feeding providing additional energy and protein to grow cattle at a rate of more than 1 kg per day in order to fatten them on pasture and get them ready for the market; (2) supplementing with dicalcium phosphate, salt and mineral licks to compensate for the lack of minerals and vitamins in the pasture but with normal growth rates of 0.15–0.80 kg per day; (3) feeding a balanced ration to zero-grazed animals in feedlots; and (4) feeding for survival in drought years just to keep the animals alive. The most widely used feed supplements are dicalcium phosphate and salt, which are usually provided during six to seven months per year. The Kalahari soils are extremely low in minerals and the natural behaviour of animals is to compensate for this by, for example, eating bones they find. This has an inherent risk of infection with anthrax if the bones are from an animal (e.g. birds) infected with anthrax.

Botswana has hardly any domestic resources for the production of concentrated feed or fodder (hay, silage, straw). Annex 7 provides an indication of the limited crop production potential in Botswana. Crop residues provide some fodder reserve in communal areas, but crops tend to fail in drought years when fodder is needed. Irrigated fodder is expensive and little is produced in the country. The roughage base (the coarse indigestible constituents) for feedlots is usually imported wheat straw from South Africa. There is anecdotal evidence that, during an FMD outbreak in South Africa, when the importation of straw was temporarily banned, some feedlots send workers into the bush to cut standing hay to replace the straw.

Besides a number of agribusinesses that import various feeds formulated and manufactured in South Africa, there are three feed manufacturers in Botswana (Tholo Holdings, Nutri Feeds and Techno Feeds) that produce feeds and supplements tailor-made for local conditions. A lot of local knowledge on research and development is in the hands of this industry. The feeds supplied to farmers are usually based on grain by-products and molasses as a source of energy and urea as a source of non-protein nitrogen (NPN). These companies are principally based in the urban centres but are reasonably well represented in rural areas, with outlets in most areas. Advice is given on the premises and the companies also have some printed advisory materials. The industry is prepared to deliver services anywhere in the country and Techno Feeds has experimented with delivering feed to farmers using the same trucks that collect the cattle for the direct cattle purchase schemes. The largest stumbling block to the use of feeds and supplements is the cash-flow of the cattle post farmer and his or her ability to pay for the inputs (s)he requires. When the truck arrives with the inputs and to collect the cattle the farmer does not have the means to pay as (s)he will receive payment for his/her animals at a later date. To collect the money at a later date is problematic.

In the past, the government-owned Livestock Advisory Centres (LACs) were the sole distributors and sellers of feed at government-subsidized prices in the rural areas. Initially purchasing from the agribusinesses retail shops, the LACs changed to a tender system and procurement in bulk from the prime manufacturers. Procurement from local shops was halted when it was found that the shops were buying subsidized feed back from the LACs in bulk, holding it until no more feed was available on the local market and then selling it to farmers at normal market prices. There were a few years when the government withdrew from this market in selected major urban centres, leaving

feed and additives retailing to the private sector.[101] This led to complaints from farmers about high prices; in response, the government restarted its involvement in the procurement and sale of inputs. Currently the LACs do not have the financial capacity to play an active role in the purchase and distribution of feeds and additives. In the past LACs had to surrender all income from sales to the Ministry of Finance and Development Planning, but this has now changed and LACs can now use the income to purchase new stocks.

One feeding practice of strategic importance in Botswana is supplementation with licks formulated according to the nutritional status of the range, the category of animals and time of the year. These licks provide minerals, vitamins, NPN and, at times, amino acids, resulting in better utilization of the basic natural grazing diet through increased intake and digestibility. The uptake of such licks is especially low in the communal sector, partly because the technology is not well known, partly because farmers cannot afford them and partly because the economic return from their use is unclear (see Section 6.5.1). The licks are provided ad libitum during the day, and it is difficult for a farmer in a communal setting to ensure that only his or her own cattle consume the lick. The use of licks, especially in the communal sector, could dramatically increase productivity and production through: (1) increased intake and better utilization of grazing; (2) increased calving rate; (3) reduced weight loss during the dry season; and (4) heavier weaner weight (Box 2). However, licks can lead to excessive drinking and may be uneconomical under certain conditions, so the extension message on the use of licks has to be carefully crafted.

Box 2 - Impact of the use of licks

Tholo Holding promotes the use of licks during the year for the maintenance of breeding cows. It estimates that one breeding cow requires:

- Summer lick of 1 bag (50kg) at BWP145;
- Production lick of 1 bag at BWP119; and
- Winter lick of 2 bags at P122.50 each.

This use of licks is assumed to lead to a 25 percent higher calving rate (from 55 percent to 80 percent) and to weaners that are 40 kg heavier (dams give more milk), meaning they reach a weight class for which the price is BWP9 instead of BWP8 per kg live weight. As a result, the return per breeding cow nearly doubles, from:

0.55 × 220 kg × BWP8/kg = BWP968

to:

0.80 × 260 kg × BWP9/kg = BWP1,872

The BWP509 investment in licks thus yields a return of BWP904, or 78 percent, far above the cost of capital of 20 percent.

However, these assumptions may be too optimistic. The analysis in Section 6.5.1 showed that, at current cattle prices, the cost of licks is not covered by increased revenues. Only through in-depth research on the assumptions will we get a clear understanding of the impact of increased investment on profitability.

The basis for animal feed for the feedlots is usually straw from South Africa and by-products from maize- and wheat-processing (e.g. bran or hominy chop, a maize by-product) imported from Zambia and Zimbabwe, where it is cheapest (BWP1000–BWP1300/tonne). During the 2010 FMD outbreaks in Zambia and Zimbabwe, feedlotters had to resort to purchasing these feed constituents from South Africa. Feed is more expensive from South Africa because of demand from the local feedlotting industry and because of the higher transportation costs. After FMD outbreaks in northern Kwazulu-Natal, the feed has to be heat-treated, which increased the price to BWP3,000/tonne.[102]

[101] The government continued to provide such services in rural areas because it was believed that the private sector would not operate in these areas because it would be unprofitable to do so.

[102] Personal communication with David Falepau, CEO of BMC in 2011.

9.1.2 Veterinary drugs

Farmers can obtain veterinary drugs from a variety of sources. The above-mentioned agro-dealers sell a wide range of veterinary drugs over the counter without registration of the buyer. In the past the LACs sold veterinary drugs at subsidized prices but no longer do, in part because of lack of funds but also because larger beef farmers bought supplies in bulk (the programme was not targeted to smallholders).

As far as could be found out during this study, there are only few practicing private veterinarians (probably fewer than 10) who also sell veterinary drugs but who mainly concentrate on pets. Given the EU market requirement that drug use is recorded to permit an audit of compliance on the withholding period and on the use of antibiotics, there is a need for a better registration of the sale of restricted drugs and their use. The latter may prove challenging for cattle farms on communal land that depend on a herd boy.

9.1.3 Breeding animals and artificial insemination

Animal breeding comprises two components: selecting superior animals and controlling the mating process to maximize the distribution of these superior genes in the herd. Testing and recording is required for proper selection performance. To control mating, the movement of bulls should be controlled or non-breeding bulls should be castrated before they are six months old. Artificial Insemination is an effective way of controlling mating, but perhaps less practical under ranching conditions. Botswana has around 20 pedigree breeders, with Brahman, Simmental, Charolais, Santa Gertrudis, Beefmaster, Simbrah and Charbrah as their most popular breeds. These pedigree animals are registered in the South African herd books, although Botswana very recently developed its own registration system. Performance testing is mainly done through Agricultural Research Centre Irene in South Africa, although there is a national beef cattle performance recording and testing scheme in Botswana under the Department of Agricultural Research of the MoA. The latter appears to be focused more on the local Tuli and Tswana breeds and on the issue of biodiversity than on improving technical/economic performance by bringing in exotic breeds.

Botswana has moved from the traditional Sanga breeds (Tswana and Tuli, stabilized crosses between taurine and zebu-type animals) into crossing with a wide variety of breeds. In the early years the main breeds used were Afrikaander and British breeds, but these were replaced increasingly by Brahman, European continental breeds and American synthetic breeds. At the moment, however, cross-breeding is done in a fairly disorganized way, and there is a danger that breeding cows lose their adaptation to the prevailing climatic and ecological conditions and to the level of management under which they are raised.103 Crossbreeding with Brahmans is widespread, but because of the lack of stratification in the cattle-keeping system104 it is not possible to control and/or maintain the genetic composition of the herd. It would require long-term research to establish the effect of this crossing, but this is virtually impossible without individual animal identification (see further) and registration. One of the reasons why composite breeds have been developed is precisely to overcome the "problem" of controlling crossing to produce commercial brood cows. Botswana developed its own composite breed, the Musi

[103] According to the wisdom of commercial farmers in Zimbabwe, "a cow should never be bigger than the management of the farmer."

[104] Under a stratified production system certain functions in the production system are allocated in certain areas and/or farming systems. For example, purebred Tswana and Tuli are kept in the most marginal areas for the production of F1 Brahman cross-breeding cows, and weaners produced with these F1 cows and terminal sires are kept in other areas.

(depicted on the cover of this report). The Musi breed is the outcome of research going back to the early 1980s and recently become commercially available (MoA 2011).

At the moment most genetic progress is achieved through imported animals or semen and selection in the resident population of pedigree animals. The spread of these genes is mainly through bull sales and occasionally through the sale of heifers. The most prominent cattle-breeding farms hold annual production sales. A Botswana beef-cattle pedigree-breeding association was recently established and is expected to organize and streamline sales and local performance-testing schemes.

9.2 Public veterinary services

9.2.1 Introduction

Botswana has been spared most of the devastating tick-borne diseases that jeopardize livestock production in other African countries. It is also free from tsetse fly. Its traditional livestock breeds (Tswana and Tuli) have a certain degree of tolerance and immunity to common animal diseases. The advent of settler farmers, with their exotic animals that did not have this tolerance and immunity, created a necessity to control ticks and internal parasites through dipping, vaccination and dosing. These settler farmers developed the export markets for beef to South Africa and other countries, mainly the United Kingdom.

When the United Kingdom joined the EU, the import of meat from its former colonies (Zambia, Zimbabwe etc.) and protectorates (Botswana and, to a certain extent, Namibia) had to be brought under European Community regulations. One of these related to the need to make sure that the meat imported into the EU would not pose a risk of bringing in highly contagious animal diseases, particularly FMD. Countries in which FMD was endemic that wanted to continue to export beef to Europe started a system of compartmentalization and zoning.[105] Areas where FMD and buffaloes were endemic ("red zones") were separated from areas free of the disease ("green zones"), where cattle can be raised for export. Cattle in the red zone are vaccinated against FMD. A buffer zone was created between the red and green zones. In this buffer zone animals are not vaccinated but are also not eligible for export as they serve as sentinels to detect any breakout of the virus from the red zone.

Botswana's veterinary services have over the years served both commercial and subsistence farmers and have been acknowledged as one of the most progressive on the continent, with outstanding laboratory and vaccine production facilities and capacities. The following sections provide an overview of the areas in which the DVS plays an important role.

9.2.2 Animal-disease prevention

As mentioned in the introductory chapter, traditionally the DVS took charge of animal health throughout the country and developed vaccination and dipping programmes. Currently, the DVS vaccinates cattle against anthrax, black quarter (quarter evil) and contagious abortion for free. Vaccinations for calf dysentery and botulism are done privately at a charge (albeit that government during droughts subsidizes botulism vaccination). In the red zone, animals are vaccinated twice a year against FMD by the DVS, free of charge to the farmer.106 Most vaccinations are done by DVS staff using DVS equipment. This programme puts a heavy burden on the state budget (see Box 3). It is also

[105] In southern Africa, Botswana, Namibia, South Africa, Zambia and Zimbabwe have all developed such a system.

[106] The recommended number of vaccinations is four, but two is more common in practice.

not as effective as it should be. Since 2000, there have been numerous outbreaks of FMD in some SADC member countries, including Botswana, and most of these outbreaks were in vaccinated cattle populations (FAO/SADC 2009). Evaluation of vaccine production and its performance/application in the field has indicated that the problem is multifactorial, including not following vaccine manufacturer recommendations strictly enough.

In case of a disease outbreak in the vaccination zone, additional ring vaccination is executed around the outbreak zone. In case of an outbreak in a zone earlier declared free from FMD, as happened in 2010, a quarantine period is imposed and animals are culled to eradicate the virus from the area. Even though compensation is paid to the affected farmers, culling is socially and economically challenging. If no serological sign of the virus is found three months after stamping out the outbreak, the zone will once again be declared free from FMD (according to article 8.5.9 of the OIE's Terrestrial Animal Health Code).

Box 3 – The cost of large-scale vaccination

The cost of the Ngamiland FMD vaccination programme consists of vaccine, labour and delivery costs. Approximately 50 teams of five members and ten supervisory teams of two members, using 60 cars, three trucks for ice and vaccine transport and two trucks for the crush-building teams are involved. Crushes are the facilities where animals are vaccinated. Each member of the team gets an allowance of BWP130/day and an average salary of BWP10,000/month. The staff costs thus amount to around BWP45 million (US$6 million) per year (270 people × 365 × 130 + 12 × 10,000). To this we can add the cost of the vaccine (US$800,000 – 200,000 head of cattle, unit vaccine cost of US$2, two vaccination per animal per year, although three are recommended) and an estimated cost of transport (US$250,000 – depreciation of vehicles, fuel, maintenance). This adds up to a recurrent cost for cattle vaccination in Ngamiland of more than US$7 million per year (adding in other running expenses and disposables).

– Based on CSO (2011), an interview with the Deputy CVO, Scoones *et al*. 2010, and authors' estimates.

9.2.3 Livestock Identification and Trace-back System

In 1997 the EU introduced the requirement that beef imports be traceable through a centralized system. Botswana already had a system based on registered cattle brands,[107] but this was not sufficient to meet the new EU requirements. To ensure continued access to the EU market, Botswana introduced the Livestock Identification and Trace-back System (LITS) in parallel with the cattle-branding system.

There are a number of EU Regulations that relate to the EU requirement for identification and registration of cattle. Regulation (EC) No. 1760/00 deals with establishing a system for the identification and registration of bovine animals and with the labelling of beef. Regulation (EC) No. 911/2004 presents detailed rules for the implementation of Regulation (EC) No. 1760/00 as regards ear tags, holding registers and passports in the framework of the system for the identification and registration of bovine animals. Regulation. (EC) No. 1082/2003 as amended by Regulation (EC) No. 1034/2010 provides detailed rules for the implementation of Regulation (EC) No. 1760/00 which deals with the minimum level of controls to be carried out in the framework of the system for the identification and registration of bovine animals. This Regulation specifies the need for the competent authority to carry out on-the-spot inspections of cattle holdings. This has been amended by Regulation (EC) No. 1034/2010, which set the level at 3 percent of holdings to be inspected annually.

[107] Cattle branding refers to making an indelible mark on an animal with a hot iron and is in part aimed at deterring theft. It reduces the values of the hides, however, and may not even be allowed under current EU animal welfare laws.

The identification and registration system requires that each animal has a unique number, that each cattle holding is registered and that all cattle movements are recorded. In the EU, animals are usually tagged with two ear tags, each with a bar code, within 24 hours of birth and their birth is reported, either through the internet, via a telephone voice responder system or by other means to the central database. Given EU requirements for on-farm recording of drugs used on animals, it is a prerequisite that animals are individually identified and also recognizable for farmers.

Botswana opted for a sophisticated system that uses rumen-bolus technology and scanners linked to portable computers. The computers capture the scanner data, which is then uploaded by the DVS officer to the central computerized database upon return to the office. In this system, a bolus is inserted through the mouth into the stomach of the animal. The bolus emits a signal that can be read by a scanner using radio frequency identification (RFID) technology. An alternative system is the use of ear tags alone (see Box 4 on Namibia's system of ear tags which was upgraded in 2011). Given the problems Botswana has experienced with boluses (see below), it is planning to change to an ear-tag system in 2013. However, for now the rules are such that no animal should be slaughtered if it does not have a bolus. The DVS will give permits only for cattle with a bolus, especially if they are being sold to the BMC. In addition, the EU requires that animals be kept in one place for a period of not less than 90 days before being sent for slaughter.

Picture 24: Tool for bolus insertion

Picture 23: Portable computer and scanner used in the Livestock Identification and Trace-back System

According to data provided by DVS, the LITS system has cost BWP260 million, or BWP22 million per year on average, in terms of set-up, hardware (boluses and inserters, scanners, laptops etc.) and maintenance from initiation in 2001 till 2013 (capturing an ongoing maintenance contract). This is funded from the government's recurrent budget and excludes operating expenses (transport, per diems, overtime etc.). The initial investment by the government in the LITS project (2001–2004) was BWP160 million (US$20 million), with recurrent annual expenditures of BWP11 million per year on average since 2005 (around US$1.5 million). The system is sophisticated and highly depended upon outside technical assistance and parts, for which the GoB signed a management and support contract with a Botswana/South African company.

During discussions with farmers managing herds of various sizes, serious complaints emerged about the system, which has increased farmers' transaction costs and affected their operations significantly in various ways. For example:

- More often than not the previous owner's details are not efficiently erased when boluses are reused. This therefore means that a farmer cannot be certain that all his/her animals with a bolus have the correct identification data.

- Farmers normally must simultaneously book a slot at the BMC, a transporter and a DVS technical assistant, a daunting challenge. Before transport, a DVS official has to come to the farm, scan all animals being loaded and issue a movement permit. As this often leads to delays for various reasons (e.g. lack of transport, absent veterinarians,[108] faulty bolus readers etc.) it was decided to construct central loading facilities in each zone. Animals are offloaded at these facilities, trucks are washed and disinfected and animals scanned and loaded, after which a movement permit is issued. The disadvantages of this system are that: (1) it still causes considerable delay (for the same and additional reasons); (2) it may imply a wasted trip (and the farmer still has to pay the transporter) if the animal's bolus is not functioning correctly (most farmers do not have bolus readers); (3) it has the risk of bruising and breaking legs as a consequence of additional handling, according to farmer reports; and (4) it may result in additional costs, such as losing out on a good market price.
- Smallholder farmers do not have their own bolus readers (which cost about US$500). As a result they cannot record the bolus-associated animal identification numbers in the herd register after they have administered antibiotics, and thus are unable to comply with requirements of export markets.

Box 4 – Sales of cattle ear tags boom in Namibia

"The Meat Board is selling double ear tag sets, which were made a requirement for cattle identification by the EU Food and Veterinary Office, at cost to producers south of the Veterinary Cordon Fence. This process takes place under supervision of the Directorate of Veterinary Services. A total number of 1.9 million ear tag sets, 1,564,000 sets of standard/ RFID [radio frequency identification] ear tags and 333,400 sets of maxi/RFID ear tags, have been sold by the Meat Board. Outstanding orders still remain high at 154,688 sets, because many producers waited until the last moment to purchase ear tags before the implementation date of 2 August 2011. A new order of 217,600 ear tag sets has been placed by the Meat Board, which is due to arrive at the Windhoek Ear Tag Office during the week of 15 August 2011. The Meat Board staff in the Ear Tag Office worked after hours on several Saturdays and Sundays to handle outstanding orders of producers."

– Meat Chronicle - 2011.

Recent reviews of LITS point to numerous additional problematic areas. A study commissioned by the MoA and conducted by FAO (Toto and Maurer 2010) found that overall the system is well designed but has failed in implementation. The shortcomings include: (1) lack of clarity in defining obligations of all stakeholders in the beef value chain under the legal framework that underpins LITS; (2) insufficient information technology support; (3) insufficient involvement of key stakeholders in the LITS decision-making process, leading to the system not being in tune with the changing needs of the value chain; (4) long intervals between data capture and entry of data into the central database because large amounts of

"The lesson from the South American beef industry is that, starting on the farm, every animal must be potentially available to all markets. It is likely that a bullock slaughtered in Rosario, Argentina, will end up as steak in one continent, canned beef in another, salami casings in a third and on the barbecue in Buenos Aires."

– Martin Cooke,
Deputy Director, Ethical Trading Initiative (in Cumming et al. 2010)

[108] DVS staff are not always available when farmers want to sell their animals, as in most cases there is only one overburdened DVS technical assistant who has to take care of many tasks across a wide extension area (e.g. vaccinating, administering government programmes, inserting boluses, issuing movement permits).

data must be transmitted from a field-data acquisition system using ageing equipment (laptop, scanner) to the central computer (LITS database) through unreliable telecommunications networks with insufficient bandwidth, or by physically transporting the field computer to the central computer; as a result the database is not current, reliable or consistent; (5) weak bolus inventory management, leading to a lack of reliability of the information provided, thus undermining the integrity of the system; (6) low bolus recovery, leading to low reuse and higher costs; (7) lack of planned harmonization with other databases (e.g. disease surveillance database); and (8) LITS reports are not in a format that easily supports decision-making.

Picture 25: Boluses recovered at a slab butchery

Part of the challenge is that the DVS implements LITS and at the same is (for the EU market) the authority that is responsible for auditing and certifying that LITS is implemented well. This conflict of interest, combined with a severe imbalance between the DVS' responsibilities and its resources, goes a long way in explaining the various shortcomings listed. It also undermines the credibility of the system in export markets. DVS initiated a programme to start addressing these issues, but much work remained in March 2012 (Grant 2012).

As indicated, the LITS system is the basis of the tracking and tracing system on which the EU beef export licence depends. Unfortunately, after a long period of condoning the shortcomings of the system, a January 2011 audit by the Veterinary and Food Organisation of the EU found weaknesses in the system. For example, the audit found that there was a delay of at least one month between identification of an animal and its entry into the central database, and as a result none of the feedlot animals encountered during the audit were in the central LITS database (EC 2011b). As a result of this and compounding factors, in March 2011 the DVS requested, at the insistence of the EC, that the BMC abattoirs be removed from the EU list of certified abattoirs, and Botswana thus de facto withdraw from the EU beef market.

LITS' shortcomings have far wider implications than the immediately evident exclusion from the high-value EU market. Under the current LITS execution by the DVS, the only cattle currently eligible for export to the EU since access was restored in August 2012 are those coming through feedlots. Furthermore, the current LITS application does not enable any variation to the system, even if it the variation meets the market-entry requirements of another importing country.[109] According to estimates from the BMC, this excludes some 700,000 cattle from being sold for export to Angola, South Africa and many other markets that do not require trace-back to individual holdings or pre-slaughter residential periods.[110] Worse still, any anomalies with LITS records for any single consignment of "EU eligible" cattle received at the BMC abattoir dooms the entire consignment to rendering, i.e. it can be used only for blood and bone meal and not even for pet

[109] Based on comments from David Falepau, CEO of the BMC in 2011.

[110] For example, the South African import certificate for Botswana requires only that their meat be verified to have come from cattle from FMD-free zones.

food.[111] Currently the BMC does not pass this loss back to farmers, but will likely be forced to change this policy if it gets into dire financial straits.

The dysfunctional LITS is the single biggest constraint in the beef value-chain system and the biggest barrier to export market entry, particularly for small-scale producers.[112] As a result, the government and the industry set out a plan to remedy the shortcomings. The approach consists of registration of all feedlots, fenced farms and, eventually, all cattle posts and settlements. The problems experienced with the boluses increase the attractiveness of tamperproof ear-tag systems that are mandated in countries such as Brazil. Ear-tag systems using electronic identification/RFID technology are in rapid development, and new-generation ear-tags are not only much improved technically but also cost a dollar or less per tag.[113]

9.2.4 Cattle movement and foot-and-mouth disease control

As already indicated, the country is divided into three areas: one where FMD is endemic in wild buffalo and where cattle are vaccinated (red zone), one where no buffalo are present and that is FMD-free and where animals are not vaccinated (green zone), and a buffer area between the two. The green zone is the catchment area for cattle for export to the EU. The red and green zones are further subdivided, as shown in Map 3.

The DVS has FMD vaccination teams that move from area to area, and other teams to build and maintain crushes and veterinary/livestock fences. The Botswana Vaccine Institute (BVI)[114] is an ISO17025-certified international reference laboratory for FMD and produces the vaccines required for the vaccination campaigns. The status of the various areas is monitored through regular sero-surveillance.

Picture 26: Foot-and-mouth disease checkpoint with dipping basin

Dynamics in the beef value chain may require some out-of-the-box thinking about alternative options to the increasingly expensive area-based disease-freedom model of FMD control in southern Africa where eradication of a disease like FMD is not feasible (assuming that its presence in wildlife is unavoidable). Some researchers (Mapitse 2008, Scoones and Wolmer 2008, Scoones *et al*. 2010) argue that some options exist between the extremes of area-based disease freedom (high value, but high risk, high cost and narrow group benefits)

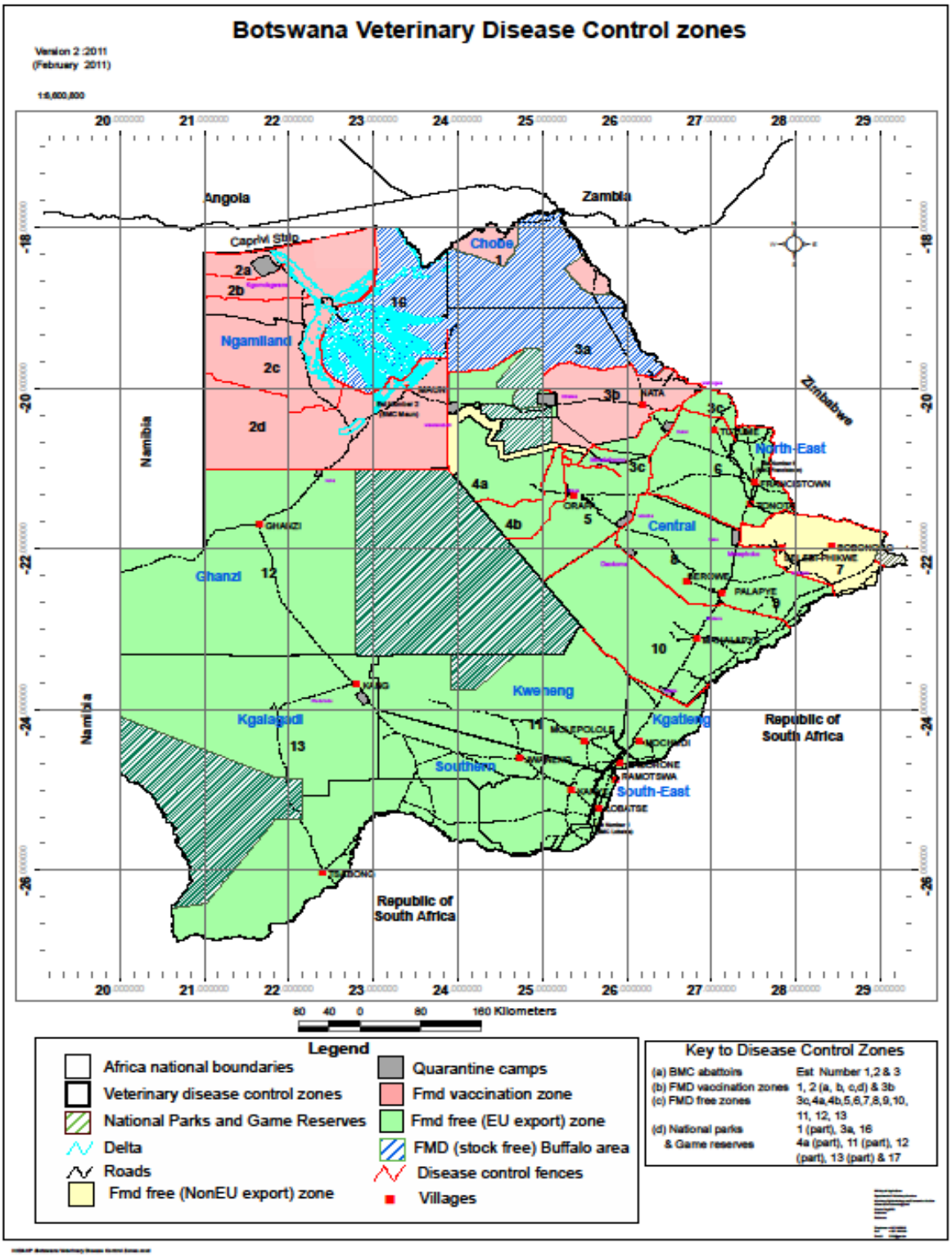
[111] By way of illustration, a standard truckload of 35 EU eligible cattle costs the BMC around BWP210,000. If one LITS ID number is missing from the movement permit or if one number is different (e.g. the animal has two boluses and the second one is read), BWP210,000 goes to the furnace. Despite these cattle being supervised at loading from a yard by the DVS itself, the BMC cannot sell them even to South Africa.

[112] The BMC estimates that there are 400,000 cattle in communal grazing areas that do not have bolus data in LITS and which are therefore shut out of the export market completely.

[113] See cattleidentification.org for some of the latest developments.

[114] BVI is a world renowned vaccination institute and sells vaccines to most of Africa and beyond.

Map 3: Livestock zones in Botswana



and managing FMD (essentially giving up on exports and redirecting government resources to non-beef economic opportunities).[115] These alternatives include export zones with vaccination, compartmentalization and commodity-based trade. Combinations of these approaches can also be considered. Which of these options is the best from a combined economic, social and environmental perspective requires further research.

Compartmentalization, i.e. the creation of isolated bio-secure islands of high-value production, is perhaps the least realistic as it requires high private-sector investment which is not in line with current levels of profitability in Botswana nor with government aspirations for broad-based benefits. It could, however, perhaps work as part of a system whereby weaners are sold by smallholder farmers to compartmentalized farms (including feedlots). Compartmentalization is also currently not accepted by the OIE as an FMD risk-management tool.

The other two options appear to have greater potential. Disease-free export zones with vaccination have been successfully negotiated by South American beef-exporting countries, including for the EU market, and attempts could be made to negotiate similar deals for exports from southern Africa. Perhaps the most promising option is commodity-based trading, i.e. focus on product safety with associated audits and certification (ensuring the beef product represents no more than an acceptable safety risk, linked to HACCP principles, e.g. through cooking or by removing bones and lymph nodes[116]). It is less costly than the area-based disease-freedom approach, has the potential to include many poorer producers and allows for a targeting of a broader set of high- and medium-value markets domestically, in the region and globally. In addition, this approach could also be applied to meat from wildlife. However, the development of standards for commodity-based trade taking place under the auspices of OIE is progressing extremely slowly (Cumming *et al*. 2010). Even when standards become available, compliance will imply significant investments in infrastructure and higher operational costs for Botswana's beef processors, which will be at a disadvantage relative to their South American competitors. A focus on high-value product and strict application of HACCP principles may nevertheless make it a viable strategy.

9.2.5 Food-safety inspection

Under the 2006 Livestock and Meat Industries Act (LMIA), all abattoirs, defined as "any approved and licensed premises in which animals or poultry are slaughtered, and any place available in connection with those premises for the confinement of animals awaiting slaughter in those premises," have been brought under the responsibility of the DVS. A register has been opened for all slaughtering facilities and inspectors have been appointed to make sure that animals are fit for human consumption and that basic principles of hygiene are adhered to. LMIA is a framework act and gives the Minister of Agriculture and the Director of the DVS wide-ranging authority to make regulations and issue decrees. In total there are now 126 premises registered under the LMIA.

There are two major issues related to food-safety inspection that are a concern:

1. There is still widespread slaughter in the bush under insanitary conditions without veterinary inspection. Meat traders slaughtering in this cheap (and illegal) way can undercut the price of traders who either run a licensed abattoir or purchase their meat from such an abattoir. Furthermore, this practice presents a public health risk.

[115] Cumming *et al*. (2010) point to the need to include wildlife-related costs in the comparison of these options.

[116] The OIE Terrestrial Animal Health Code has still not recognized the beef maturation time process of keeping the deboned meat without lymph nodes under controlled pH and temperature as an FMD deactivation procedure (Mapitse 2008).

2. "Beef measles" still occurs in cattle in Botswana. If meat infested with these cysts of *Taenia saginata*, the beef tapeworm, also known as *Cysticercus bovis*, are eaten by humans they develop into mature tapeworms. The incidence varies: the BMC estimates that 11 percent of carcasses are infected, while the DVS found up to 34 percent infected in certain communal areas near Francistown and around 1 percent on the hardveld.[117]

The first problem undermines the development of a modern beef value chain in which there is a level playing field for all and in which people can invest with confidence in meat-handling facilities. The second issue, besides being a public health threat, also diminishes the efficiency of animal production, which should be an argument for farmers to take measures to control and prevent this affliction.

9.2.6 Quality-control and management systems

Usually quality-control and management systems are self-regulatory mechanisms, developed by the industry and agreed upon by all chain stakeholders, de facto becoming "licences to produce/trade". A company that wants to export to the EU should have an audited HACCP system. To have a working HACCP system means that all the prerequisite programmes should be in place. These prerequisite programmes concern the following:

- Good agricultural practices (GAPs). These are nowadays laid down in the GlobalGAP standards. This is a system to reassure consumers that food is produced in such a way that the use of chemical inputs is minimal, that the environmental impact of the farming operations is minimal, that animal welfare has been taken into account and that workers' health and safety have been taken care of. This requires an animal identification and tracking system and recording of the use of drugs and antibiotics. It creates an agreement between producers and retailers on the conditions of production. For example, the Namibia Meat Board together with the industry and producers developed the Farm Assured Namibian Meat (FAN Meat) scheme; the FAN Meat logo signals to customers that the conditions under which the meat has been produced meet high quality and safety standards.

- Good hygiene practices (GHPs). These lay down how regular cleaning must be done in an abattoir or processing plant, how workers' personal hygiene and working outfits must be taken care of and so on. All of these processes are laid down in detailed and extensive documents and their actual implementation is monitored through checklists that people sign off on. A GHP programme is accompanied by regular laboratory testing to check the bacteriological cleanliness of premises and equipment.

- Good manufacturing practices (GMPs). These lay down the systems to be adopted in processing and manufacturing meat and meat products, i.e. the quality control and quality system covering the manufacture and testing of the meat and meat products. GMPs outline the aspects of production and testing that can impact the quality of a meat product from food safety and food technology points of view. Included in these are standard operational procedures (SOPs) that lay down, for example, how long before slaughter animals should arrive in lairage,[118] how animals should be stunned,[119] how animals should bled, how much time there

[117] Based on communication from the Deputy Chief Veterinary Officer.

[118] A lairage is an accommodation for farm animals at slaughter facilities or markets.

[119] Stunning is the process of bringing the cattle to a state of unconsciousness. It has marketing implications as, for example, for Halal slaughtering the process has to be reversible. The latter is not required for animal health reasons.

should be between bleeding and evisceration,[120] at what point in time the animal should be weighed and so on.

These good practices assure that there will be fewer critical control points left when an HACCP system is designed, as many potential critical control points are taken care off in these GAPs, GHPs and GMPs. Usually a branch organization, together with stakeholders, develops such systems, as was the case for the Namibian Meat Board. There are generic plans that can be adapted to the specific conditions of the industry in a particular country. It will be up to the industry to train farmers and workers to understand the systems and apply them correctly.

When there is an industry-driven quality-control and management system in place along the value chain, we can talk about a self-regulatory system, whereby public authorities need only check of the regulation.[121] In Botswana, however, individual ranchers, farmers and meat processing companies developed their own systems. There is little or no collaboration between actors to develop a standard system for the whole country and most processes can only be enforced through inspection and penalties by the DVS.

9.3 Finance and insurance

9.3.1 Investment finance

There are various public sources for investment finance, such as the National Development Bank and the Citizen Entrepreneurial Development Agency (CEDA). CEDA also provides grants if the funded projects can show their financial viability (BIDPA 2006). These public financing sources provide concessional conditions if one is not eligible for credit from private commercial banks[122] because of collateral constraints (e.g. leasehold land may at times not be seen as solid collateral by a financial institution). There is no central loan registration or integration of databases on loans in Botswana and it has been known for loans taken from one organization to be repaid using money obtained through a loan from another organization.

The amount of commercial credit to stakeholders in the beef value chain in Botswana is significant. The aggregated loans from the five domestic banks was BWP742 million in 2010 (Figure 17), i.e. similar in value to the country's beef exports that year. Among the five domestic banks, the National Development Bank and the Bank of Gaborone have been the largest lenders by far. The steep upward trend from 2007 to 2010 and the steep decline in 2011 likely reflect the growth of the weaner model and the loss of the EU market respectively.

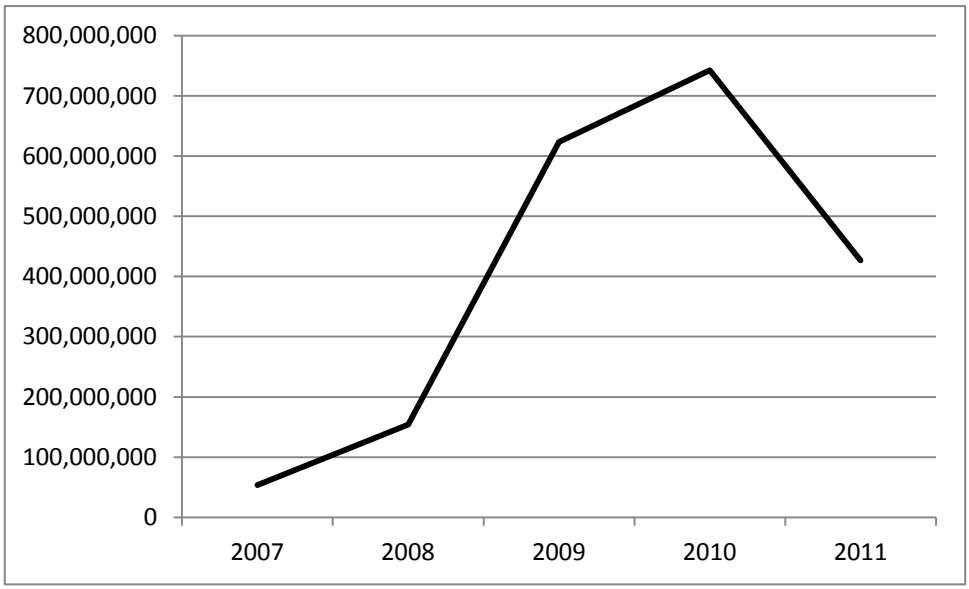
Investment capital may also come from other sources apart from bank loans. The government, through its Land Boards, still issues blocks of land to prospective cattle farmers. In the past, the standard was an 8 by 8 km plot; nowadays the standard is a 6 by 6 km plot. The areas where plots are granted are increasingly marginal and remote, as the better land has already been allocated. The GoB has also provided direct investment loans to the BMC and provides significant financial support for investment at the farm level through its various subsector development programmes.

[120] Evisceration is the removal of the viscera, the internal organs, from the carcass.

[121] Generic models of such systems from other countries could be used as the starting point and adapted to Botswana.

[122] Commercial banks such as Barclays and Standard Bank have financed and still do finance investment in cattle production in Botswana.

Figure 17: Aggregated commercial loans to the beef value chain in Botswana (in BWP)[123]



Source: data received from the Ag Hub/MoA.

9.3.2 Working capital

Beef production has a long production cycle. Decisions on breeding made today will result in an animal that can be sold for slaughter and that potentially can impact income only after three to five years. The purchase of additional brood cows (cows used for breeding) will also only give a return when weaners or slaughter animals are sold. Improved feeding of animals results in additional income only at the time of sale. This can be after 100 days for animals in a feedlot, and much longer in the case of a brood cow.

One of the problems in the beef value chain, as already indicated, is the fluctuation in animal numbers over time. This fluctuation is linked to weather patterns, which influence the availability of grass from pastures which, for most farms, cannot be compensated for by an increased use of feed. This is not only a problem of feed availability but also of accessibility, as many farmers do not have cash to purchase feed.

Loans for working capital are risky for banks to issue, as these loans are very fungible, hard to monitor and not linked to hard assets. In some countries cattle buyers conclude forward-buying contracts with farmers and pay farmers some money in advance, from which the farmer can finance his operations; one such scheme is working already in Namibia .[124] Banks would be more inclined to give credit to a company with fixed assets than to a farmer with only mortal moveable assets such as cattle, but may also consider credit backed-up by forward contracts from reputed buyers such as the BMC.[125]

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[123] This reflects loans provided by Batswana banks (First National Bank, National Development Bank, CEDA, Bank Gaborone and Capital Bank. Information on loans provided by the international banks in Botswana (Standard Chartered, Barclays, Stanbic) was not available and is excluded from the figure. The figures reflect both working capital and investment loans and may also reflect loans paid off with other loans.

[124] For details, see http://www.meatco.com.na/

[125] The BMC's challenge to meet its financial obligations to farmers in March 2012 presents a major setback in this regard (Sunday Standard Online 2012).

9.3.3 Livestock insurance schemes

In 2010, the Botswana Insurance Company launched a set of livestock insurance products developed in South Africa. The insurance premium varies from 0.7 to 8.1 percent of the value of the cattle, depending on the number of animals insured, the deductable and the specific coverage chosen. As the issue of these insurances is conditional on the application of good management practices, it is mainly more-commercial farmers on ranches or at cattle posts who have joined the schemes.

There is a policy for stud animals, as well as herd-essential and herd-select policies. These insurances cover theft, accidental death, transit-related losses and death of livestock from an uncontrollable disease[126] but have conditions requiring the farmer to take prescribed preventive measures (e.g. vaccination).

In the last 10 years, insurance companies across the developing world (e.g. in Kenya and Mongolia) have developed new agricultural insurance products, so-called index-based insurance schemes,[127] which seem to be working although they still rely on some level of support from the government. These products provide some protection against calamities such as severe drought or floods and might even at some stage be extended to include animal disease coverage. Such index-based livestock insurance schemes are more suitable for people who would normally not take out a traditional insurance policy and who would normally not be accepted by insurance companies because they lack good collateral.[128] Given their potential to support smallholder cattle farms, such insurance schemes are often developed as public–private partnerships (PPPs). When an insurance scheme targets smaller-scale communal livestock farmers, a government could find justification for subsidizing or entirely funding the participation of these farmers in such a scheme as part of a social safety net. However, early experiences with these index-based insurance schemes are that even here it is the more-commercial, market-oriented farmers who purchase them.

9.4 Transport

In the past, livestock were trekked to the abattoir, which could take up to a month if trekking from Ghanzi to Lobatse. Nowadays all transport has to be in trucks and has to comply with set rules and regulations.

Two main types of transporters can be distinguished: private individuals or companies using smaller non-specialized trucks and trailers; and companies with specialized trucks capable of transporting 100–130 head per trip.

For the commercial operations linked to the BMC, the cost price for transport is calculated using a formula that includes the length of the truck used, the kilometres travelled and a constant (in 2011 this constant was BWP0.9). The cost of transport on large trucks is about 75 percent of that on ordinary trucks.

Transport of livestock in Botswana has to comply with national legislation governing animal transport, which is in line with EU regulations for livestock transport.[129] Besides issues of animal health and the prevention of spread of diseases, there is the aspect of animal welfare, which in the

[126] The losses related to the forced culling and destruction of animals in the area of an FMD outbreak are not normally covered under an insurance programme, but rather through public emergency support programmes.

[127] For details, see http://livestockinsurance.wordpress.com/

[128] Although in the case of Botswana, livestock owners who live in town can put up their houses as collateral.

[129] Council Regulation (EC) No 1/2005 from 5 January 2007.

EU is translated into requirements for minimum space per animal, the number of hours animals can be transported non-stop and documentation for trucks, including their disinfection records. One of the requirements is for a DVS veterinarian to be present when animals are loaded, so that he or she can scan animals for the presence of a bolus, record the numbers and issue a movement permit after he or she has established that there are no clinical signs of disease. This requirement is often a serious problem in practice because of the lack of transport for the veterinarians, malfunctioning scanners or computers or simply the lack of (charged) batteries.

Picture 27: Cattle truck at a loading ramp

Since April 2011, there are new DVS rules for the transport of animals. Animals now have to be brought to a specific set of central loading centres in the respective veterinary zones (these are not linked to the LACs). The recently built centres include a borehole, pens, a water reticulation system, staff housing and a truck-washing facility, and thus represent a significant government investment. At these centres, animals are off-loaded, trucks are disinfected and animals are scanned and reloaded. This new system increases efficiency, as veterinarians (and their working scanners and computers) now have to monitor transport only in the central loading places, rather than at each individual farm.

There are a number of drawbacks in this system (inherent risks or flaws in their design). First, although it improved the efficiency with which the veterinary services can work, it put additional stress on the animals, with another round of off-loading and reloading, leading to more bruising and, in rare cases, to damage to the animals (e.g. broken legs). It has happened that animals found with a bolus when loaded at the farm are found not to have a bolus in the central loading facility and thus have to be transported back to the farm at additional expense.

Second, the disinfection of the large two-tier trucks with the equipment currently available at these central loading facilities is cumbersome. Disinfection is done with knapsack sprayers, which is not efficient and effective, and reloading the same animals on the same truck makes the exercise of disinfecting irrelevant anyway.

Third, there is a risk that if animals from different origins and with different destinations (slaughterhouse, feedlot) are held at the holding ground at the same time next to one another diseases that are not yet manifest can be transmitted across groups of animals. It is therefore important to have a complete record of which animals were together, on which day, at which particular central loading facility. For example, the 2001 FMD outbreak in the Netherlands was traced back to young calves, bought in Ireland for veal production, that on their way to the Netherlands had to be off-loaded and rested in France in a central animal holding site next to English sheep with subclinical FMD infection.

Fourth, it is difficult to apply EU transport rules under the conditions prevailing in Botswana. One of the risks of providing animals with water on the way to the truck is that the animals lie down and might get trampled. There is no system for licensing transport companies and for training and certifying the drivers, who are responsible for making sure that the veterinary rules are adhered to, that animal welfare is observed and that the animals are brought in the best possible condition to their next destination. For cattle supplied to the BMC, transport firms go through a rigorous vetting process before getting assignments, and their activities and records are inspected.

9.5 Extension

Livestock extension in the current structure is the domain of DVS officials working from the various LACs, as well as from other DVS offices.[130] There is a network of 36 LACs (Map 4) that could play a central role in the introduction of new technologies and practices. At the moment, however, this network is largely a government-managed input-supply system. The free-of-charge advice and information provided to farmers usually relates to the input products on offer.[131] Most of the work of the LACs is geared towards disease control and informing farmers about diseases. LAC staff are not always in their office or shop, as they often have to make on-farm visits, for example to inspect or scan animals. Hiring more livestock-production specialists for the LACs would be one way of widening the scope of the advisory messages given to farmers. Links between extension and research are generally weak (BIDPA 2006). Year-round input availability in sufficient quantity is not guaranteed.

9.6 Research and development

Research and development activities related to livestock fall under the Department for Agricultural Research, which has two technical divisions (an animal production and range research division, and a crops division) and two additional divisions (support services and administration). The department runs beef improvement programmes centred around crossbreeding, on selection within the Tswana cattle population, on developing a Botswana composite breed (the Musi mentioned earlier, MoA 2011) and on evaluating the different breeds and their crosses in the country. Besides the beef programme, there is commodity research on dairy, smallstock, range and pastures, feeding programmes, conservation practices and ostrich production. The department plans to engage with the International Livestock Research Institute in a longitudinal study of the beef value chain, whereby much-needed economic and financial data will be collected.[132]

There is a need for research to solve pertinent problems in the sector. One of the major needs is improved dry-season feeding of livestock and summer grazing supplementation. Worldwide, there is a wide range of experience with strategic and often low-cost feed supplementation for livestock, of which is little practised in Botswana.

In the field of range management there are two distinct main approaches: the classical approach and the upcoming intensive holistic approach. The latter is discussed in Section 10.4. As the range is the basis for Botswana's livestock production system and is also of essential importance for Botswana's wildlife, it would appear important to develop a better understanding on how holistic range management works and what its advantages and disadvantages are. In other words, it has to be translated from a belief system to a practical management system that could become a driver behind a strong sustainability image for Botswana beef.

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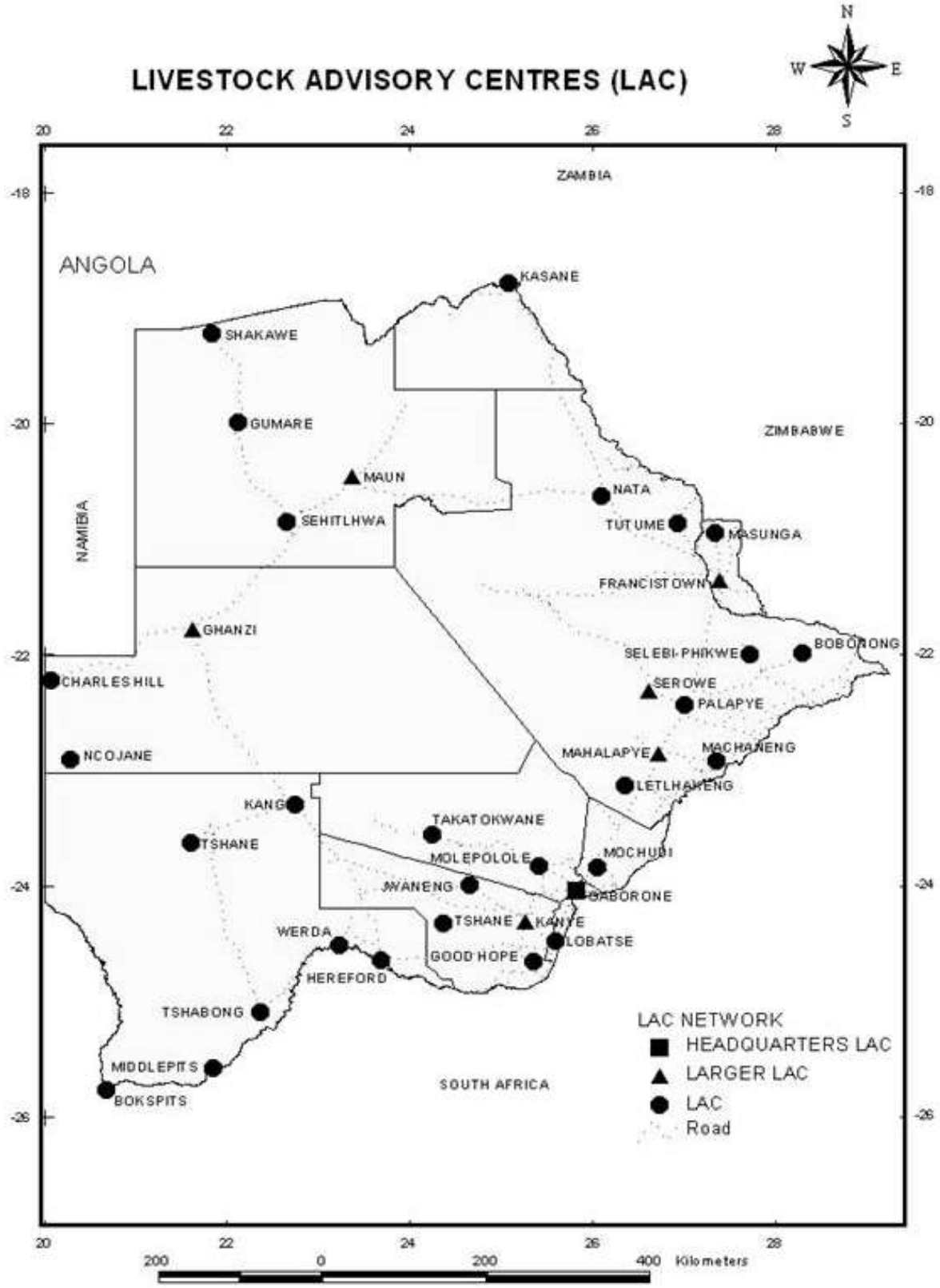
[130] Farmers can also get advice from a few private consultants that are undertaking extension, but unlike DVS staff these consultants must be paid by the farmer. Farmers may also be getting advice from feed suppliers or non-governmental organizations. Extension advice from these three sources is assumed to be minimal in Botswana, especially for smallholders.

[131] Broadening the services offered by the LACs and making them operate more like regular businesses, as the GoB intends to do, may have a positive impact, but also creates a potential risk of conflict as certain drugs or antibiotics may be promoted because of their impact on the LAC's performance as a business, rather than their technical performance on-farm.

[132] The existence of some economic ranch development models was mentioned by the department, but these models could not be made available for this study, nor were sample farm budgets available from the Department of Agribusiness Promotion at the MoA. This study therefore developed its own (limited) models for stylized farms as presented in the previous sections.

Map 4: Map of the livestock advisory centres, Botswana



Source: DVS

Apart from supplement-based feeding and holistic range management, research is also needed on improving the productivity of pastures. This should include research on: (1) bush-clearing techniques (e.g. through the use of goats); (2) areas with permanent fodder and pasture production, with introduction of new species in zones with medium to high rainfall, and the associated aspects of optimized haymaking and storage; and (3) the use of cutting-edge technologies such as new microbial fertilizer products.[133]

The research conducted at the Department for Agricultural Research is purely technical; it does not look at the economic or business aspects of cattle farming. There is little insight into the profitability of a farming system. No farm business models were available from the Department of Agribusiness at the MoA or from the Botswana College for Agriculture. However, policy-makers need solid analysis of economic and financial parameters to assess the impact of their policies and programmes.

Ultimately, to achieve real impact, research, extension and distribution (agro-dealers) need to collaborate more intensively in the development of packages and recommendations for farmers that are both practical and make good business sense.

10 Policy issues

Livestock production is of great strategic importance to GoB as it has both competitiveness and rural poverty alleviation aspects. As a result, GoB's involvement in the beef value chain is pervasive. Many services for the livestock sector that elsewhere would be considered a private good are a public good in Botswana.[134] The government promotes cattle keeping indirectly through subsidized loans and tax advantages, and directly through a variety of programmes that provide feed and husbandry inputs, support the construction of boreholes and provide free maintenance of perimeter fences and free veterinary services. These programmes are largely not targeted to particular farmer types, but their benefits appear to be captured more by richer households than by poorer ones (BIDPA 2006).

There are no detailed studies available that compare the cost of the various support programmes to their economic, social or environmental impact. It is therefore impossible, other than through key informant impressions, to assess whether these programmes: (1) cost more than the economic benefits they create; (2) in practice mostly benefit large-scale cattle farmers or have a strong positive impact on smallholder farmers; or (3) facilitate development of a sustainable, competitive value chain or are a social-support programme.

Looked at from a different angle, government expenditures on economic services related to agriculture, forestry and fisheries in 2009/10 and 2010/11 were roughly BWP1 billion annually (Bank of Botswana 2010).[135] If we make the not unreasonable simplified assumption (probably an underestimation) that expenditure by subsector is proportional to the share of the subsector in agricultural GDP, then, given cattle's 57 percent share (see Annex 3), we can state that the GoB spends roughly BWP600 million on a subsector that generates BWP1.3 billion a year. This is almost half a pula per pula generated. Since the programmes (development funds) represent around

[133] For example, Forage Boost, from Bio Soil Enhancers, Inc., is an award-winning microbial fertilizer for increasing forage production on pasture land in an environmental friendly way. More at: http://sumagrow.org.

[134] The same applies to grain production (maize, millet, sorghum), whereby the government pays for ploughing, cultivation, seeds, fertilizer, fences and sowing, among other things.

[135] These expenditures include both recurrent expenditures (e.g. MoA payroll, the DVS FMD vaccination programme) and variable development expenditures (which fund the various programmes).

40 percent of total expenditure, and assuming a national herd of 2.7 million cattle, we estimate the cost of these programmes at around BWP90 per unit of cattle per year (i.e. similar to the estimate for 2002 in BIDPA [2006]). Assuming an offtake of 316,000 head (Annex 3), this translates into BWP760 of programme support per head of cattle sold at an average price of BWP4,100 (i.e. almost 20 percent). In addition, there is the support the BMC at the processing level, e.g. in the form of interest-free loans.

10.1 National Development Plan

The following summarizes the livestock development plan in the tenth National Development Plan (NDP):

> *9.264 The programme has components for improving the quality and quantity of beef and dairy cattle, small-stock, poultry and pigs. It will assist farmers to develop basic infrastructure for farming and purchase some of the inputs. The programme also seeks to support the development of the poultry (chicken and ostrich) supply chain through establishment of chicken abattoirs and parent breeding stock facilities. On dairy, a nucleus herd to supply dairy farmers with breeding stock and strengthening of technical and management skills of farmers and extension officers will improve the performance of the subsector. Livestock farmers will be assisted with drilling and equipping of boreholes in areas where finding water is a problem and resource-poor farmers will be assisted through the supply of start-up stock for small stock and poultry. The programme develops strategies for the growth of the agricultural industries and monitors and evaluates the economic performance of the sector. The policy is to liberalise beef markets and expand the export base of agricultural products.*

Table 33 shows how key performance indicators for the most important sector goals for the cattle subsector should change over the coming years. The plan clearly indicates the GoB's intention to strengthen the role of agriculture, and especially of the livestock sector, in the country's overall GDP.

Table 33: Cattle development goals in Botswana's National Development Plan

Sector goal	Baseline		Targets						
(Key performance indicator)	Year	Ach.	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Facilitate growth and comp. of agric sector (Ag% in GDP)	2008/9	1.7	1.7	1.7	1.8	1.9	2.0	2.1	2.2
Increased beef production (offtake %)	2008/9	10	10.5	11	11.5	12	13	14	15

Source: GoB (2010).

Livestock development is seen as an important instrument for the government to use in reducing poverty and increasing food security, not necessarily through livestock products directly but also through increased income. The government provides significant financial support to the various aspects of the livestock sector.

Livestock accounts for 57 percent of agriculture's contribution towards Botswana's GDP. Botswana is self-sufficient in beef and poultry, but not in small stock. The country is currently only

20 percent self-sufficient in grain,[136] with enormous variability depending on rainfall (Map 1). The average yield is usually quite low, at 500 kg/ha per year (FAOSTAT). If the country were to raise its grain self-sufficiency to 50 percent (i.e. 127, 000 tonnes of grain) with this average yield, 1 million ha[137] of land would have to be brought under cultivation at the expense of the grazing area of cattle. With the government carrying the burden of the cost of inputs (farmers are reluctant to invest in the risky enterprise of grain production), it might be more effective and efficient for the government to promote the production of animal fodder through establishment of permanent perennial grass pastures planted with suitable species (e.g. *Cenchrus ciliaris*, *Chloris gayana*, *Eragrostis curvula*) that could be used for haymaking and/or deferred grazing.[138] If most of the existing crop fields were fenced (which is not the case), they could be used for hay production, which would increase the animal feed base and stabilize the number of breeding cows. For example, hay from years with good rainfall can be stored for one or two years to provide fodder in years with poor rainfall, thus helping keep brood cows alive.

10.2 Laws and regulations

The most important laws related to livestock are:

Law 36:01 Control of Livestock Industry

Law 36:02 Branding of Cattle

Law 36:03 Livestock and Meat Industries, with sections on

- Grading of Carcasses Regulations
- Livestock and Meat Industries (Meat Inspection, Control of Red Meat Abattoirs)
- Livestock and Meat Industries (Poultry Abattoir Regulations)
- Livestock and Meat Industries (Producers' Agent Regulations)
- Livestock Bones (Export Levy Regulations)

Law 36:04 Registration of Livestock (replaced by the Livestock Improvement Act)[139]

Law 36:05 Pounds

Law 36:06 Matimela[140]

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[136] The main grains are maize and sorghum. Sorghum yields (900 kg/ha) are far higher than those of maize (250 kg/ha).

[137] Botswana's actual arable land area is less than 500,000 ha, but potential arable land are totals 9 million ha (FAO 2000). These 9 million ha are probably currently under grassland.

[138] Deferred grazing refers to areas that are grazed only at specific times, e.g. towards the end of dry season or during calving.

[139] The Registration of Livestock Act was replaced by the Livestock Improvement Act. The latter was established in 2009 but implemented only in 2012 and provides for the improvement of the livestock industry through the establishment of an Animal Production Advisory Board and a national stud book association. The latter implies that breeders no longer have to register with the South African Stud Book.

[140] Matimela refers to stray livestock.

Law 37:01 Diseases of Animals

Law 37:02 Cruelty to Animals

Law 51:01 Cattle Export and Slaughter Levy

Law 74:04 Botswana Meat Commission

Many of these national laws need to be reviewed to determine to what extent they are in agreement with existing EU legislation. The following are a few examples of EU laws that have a bearing on the national legislation in Botswana:

- On animal transport: Regulation (EC) No. 1/2005 covers the whole transport chain, including training of drivers and attendants, licensing of vehicles following inspection to ensure they meet minimum standards and improved enforcement with licensing of transporters and upgraded standards of transport.

- On animal identification and registration: within the EU, requirements include double ear tags with unique number for each animal, maintaining a register on each holding (farm, market etc.), cattle passports and a computerized database at national level. Botswana will need to combine the cattle branding act and the current LITS system into an animal identification and registration act that satisfies all EU requirements and enforce them.

- On hygienic packaging: Regulations addressing this area include the Food Safety Framework Regulation (EC) No.178/2002, Regulation (EC) No. 852/2004 on the hygiene of foodstuffs, Regulation (EC) No. 853/2004 (which lays down specific hygiene rules for food of animal origin), and Regulation (EC) No. 854/2004 (which puts in place a framework of official controls on products of animal origin intended for human consumption). Directive 96/23/EC also has on measures to monitor certain substances and residues thereof in live animals and animal products.

All stakeholders must be aware of the existing legislation, rules and quality-control systems. In many countries the responsibility for ensuring this is the case in the meat industry falls to a professional body, such as a National Meat Council, financed indirectly by the sector through levies. Botswana does not have such a body.

10.3 The BMC Act

The BMC Act regulates the Botswana Meat Commission. To quote a few key statements from the Act:

> *This commission is established to purchase cattle and to slaughter the same and prepare and sell the products of such slaughtering, or to sell on the hoof cattle so purchased. It may in its discretion and with the consent of the minister, promote schemes for the improvement of the standards and condition of cattle to be sent for slaughter or sold on the hoof and promote other commercial schemes for the development and improvement of the livestock industry. This all with the purpose to promote the interests of the livestock producing industry of Botswana. It should ensure that its business is conducted efficiently and economically and in a manner which in the opinion of the commission is best calculated to achieve the purpose for which it is established.*

This quote contains the phrase "with the consent of the Minister," which potentially makes every key strategic decision at the BMC a political one.[141] Every strategic decision made by BMC management can in principle be overruled by the Minister and every decision with major financial implication needs to be authorized by the MoA. The BMC, while enjoying the privileges of a monopoly, has less managerial freedom than other meat processors in Botswana and in key competitor countries such as Namibia and Brazil. All other things being equal, these two factors (monopoly, managerial restrictions) can easily lead to processes and structures (e.g. negotiated pricing structure and procurement system, over-investment in processing capacity) that can negatively impact the BMC's performance from a pure competitiveness perspective.

The BMC Act has been discussed on various occasions and amendments to it have been proposed since at least 2003. The most pressing issue is whether the monopoly on the export of live animals and meat is still in the best interest of producers, given that the main goal of the BMC is to pay producers the highest price possible. Strictly speaking, the objective is to maximize the return to farmers, which consists of the price paid for cattle shortly after delivery (best price possible) and a share in any surplus generated (deferred payment).[142] The latter is based on the BMC's net profits, which are paid out to the farmer except for a retained strategic reserve.[143] Therefore the core issue for financial performance is less the price paid to the farmer than the efficiency of the BMC (which is linked to the strategic reserve not being used to cover inefficiencies or, worse, drains) and its ability to maximize its revenues. From existing reports, it seems that the BMC has since the 1980s covered its internal inefficiencies by paying low prices to producers, a situation that was not addressed until the introduction of EPP in 2006 and the DCP in 2008. A complication that arises in the weaner model is how the surplus payment should be distributed between the farmer and the feedlotter.[144]

A monopoly can only be justified if the economic inefficiencies (or above-normal profits) normally associated with a monopoly are offset by the fulfilment of a number of public functions. The latter was, for example, the case for the CSC in Zimbabwe, which is in principle comparable to the BMC. The CSC supported communal farmers through: (1) forward-selling contracts that included an initial down payment; (2) small loans for feed; (3) breeding cow leases; (4) CSC-managed holding grounds for carrying breeding cows over droughts; and so on. The BMC never provided such support. It is thus good that possible modifications to the BMC Act are being discussed in public forums. Allowing the various stakeholders in the beef value chain to voice their concerns before changes to the Act are effectuated, will help avoid accusations after the fact of conflicts of interest in the decision-making process.

[141] The Minister here represents the shareholder of the BMC, which is the people of Botswana, or at least its cattle producers.

[142] The unique aspect of the BMC of not generating a net profit but rather a surplus also implies that, unlike other meat processors or any manufacturing company in Botswana for that matter, the BMC does not pay tax on its net profits but rather is taxed on its gross turnover. The BMC has, however, been exempted from paying tax in (the many) years when a loss was recorded.

[143] The strategic reserve consists of revenues not paid to the producers but rather held in reserve to pay for necessary upgrading. Although the BMC Act stipulates what strategic reserve fund the BMC can hold, the company has over the years been bailed out on many occasions by the government.

[144] Or more generally, how the economic benefits are distributed between farmers and feedlot operators based on what the BMC pays for weaners, yard fees and feed, and at what prices it sells its beef in the local and export markets.

10.4 Rangeland and wildlife management

Before the advent of "commercial" beef production and fences in the 1950s, Batswana livestock keepers moved with their animals, usually together with wildlife, under a high-density, short-duration grazing regime. This resulted in heavy, non-selective grazing with a long period of rest for the vegetation, especially in areas without permanent sources of water. The 1975 Tribal Grazing Lands Act facilitated a shift in the management of pastures from local chiefs to local land boards established under the Tribal Land Act of 1968, on which local government, farmers, the traditional leadership and national government were represented. This law was amended a few times. In 1991, the target group was changed from "the tribesmen" to "the citizens of Botswana" and the traditional leadership and local government representatives were removed from the local land boards. Essentially, the westward movement of owners of large herds out of the already crowded communal grazing areas of the east to establish permanent cattle posts in the Kalahari sandveld was facilitated by the TGLP, which granted exclusive land rights to establish fenced commercial ranches that use deep boreholes (Darkoh 1999).

Under the current land-management system it is possible for an individual to ask for a lease for a plot of land, over which he or she has exclusive user rights. This was and still is seen as a way to increase the level of commercialization in agriculture and to improve the management of the range resource. However, for this to happen there is a need for perimeter fencing, boreholes and other investments, as well as for improved overall management. As already indicated, securing financing for these investments is challenging as the land is not always readily accepted as collateral. Without further investments in internal fencing and improved management practices, a borehole and a perimeter fence are mere tools to keep animals from straying, and they essentially only increase the grazing pressure on a finite resource of land as the cattle are confined to a restricted grazing area. This has contributed to a rapid desertification of the Kalahari sandveld in the western part of Botswana (Darkoh 1999).

One of the shortcomings of this policy of fencing farms to commercialize the production has been the "dual rights" system: the leaseholder of such a land resource is still considered part of the community that uses the communal grazing resources. This means that these farmers can still graze their cattle on the communal pastures, keeping their fenced farm as a dry-season deferred-grazing resource. This leads to high stocking rates on the communal resource during the growing season and a serious shortage of standing forage on the communal land. This dual-rights issue plays a role only in the margins of the fenced farming areas and is a localized issue.

The fencing policies started for the commercial farms with freehold titles in the 1950s, followed by veterinary fences in the 1960s. In the early 1980s there was a move towards fencing parts of communal lands for individual use, but this was slowed because of the social unrest it created among rural farmers. In the late 1980s and early 1990s, when cattle prices were low, commercial game farming was seen as a more profitable alternative to cattle ranching. Some especially large commercial farms moved into game farming at that time, resulting in a considerable dip in the number of cattle on commercial farms. Contrary to what happened in Zimbabwe and South Africa with conservancies, i.e. conglomerates of private farms adjacent to game parks becoming hunting and tourism enterprises, game farming in Botswana has not yet developed into an alternative to commercial beef farming in the more marginal areas for cattle farming.

In the 1970s a new school of thought developed in the field of range management, the so-called holistic approach, based on the observations of Allan Savoury, a tracker in what was then Rhodesia. During his frequent ground patrols in the Zambezi river valley, Savoury noticed that the highest wildlife grazing densities (comparable to, for example, the wildebeest and zebra migration in the Serengeti/Masai Mara ecosystem) did not lead to overgrazing and erosion, but, on the contrary, to a far more vigorous and diverse vegetation. Savoury combined these observations from the wild with his observations on what was happening on the fenced commercial farms in Rhodesia – a reduction in palatable "sweet" grass species, bush encroachment, reduced water retention, increased erosion and thus reduced carrying capacity and stocking rates over the years.

Rather than following conventional wisdom and opting to destock the ranges, Savoury persuaded farmers to change their grazing management into a short-duration, high-density grazing system, resulting in far less selection during grazing and longer periods of rest for the vegetation. This system became known as "holistic resource management." It requires more internal fences and watering points, but most farms that followed this approach could drastically increase their stocking rates and at the same time see biodiversity, the share of palatable grasses and overall biomass production increase over time; the system basically leads to a shift from annual to perennial grasses. The additional benefits were shown to more than pay for the costs of the intensified management system (more plots, more fences, more watering points and more frequent changing of paddocks). However, there is considerable controversy over the benefits of the holistic approach (see, for example, Burgess 2000).

Notwithstanding the seemingly promising benefits,[145] holistic resource management in cattle farming has not been adopted in Botswana (or in Zimbabwe) beyond a small segment of the farming community. Many farmers hesitate to make the initial investments, especially in Botswana where there are few fenced farms, and to commit to the increased management intensity. Some farmers are also afraid of what would happen in this system in a really bad drought.

One of the contributing factors to bush encroachment, besides a reduction in grass vegetation, is the absence of wildlife, which usually browses[146] more than cattle. Holistic resource management thus potentially promotes farming in harmony with wildlife as another way of increasing biodiversity. The increase in wildlife biodiversity also seems to reduce the interest of predators such as cheetahs and leopards in cattle, which focus on hunting game. As a result, the increase in wildlife biodiversity does not necessarily have a negative impact on overall profitability of beef farming.

But there is still much concern about the possible negative interaction between cattle and wildlife in Botswana (most notably, buffaloes as carriers of FMD). The veterinary cordon fences have cut off traditional migratory routes, particularly those of large grazing herbivores such as wildebeest and tsessebe, which were found dead in large numbers at the veterinary cordon fences during the droughts of the 1980s (Mbaiwa and Mbaiwa 2006). Cattle compete with other grazing herbivores in the farmland where both are present. Predators are shot when they prey on livestock, which is increasingly common where the overall wildlife population is shrinking.

Picture 28: Buffaloes are carriers of foot-and-mouth disease

The government reserves all rights for the use of wildlife, so game cropping[147] is not an option outside

[145] For example, cattle farmer Dudley Barns has successfully implemented holistic resource management in Botswana and his farm is widely admired in the country. For an example from Zimbabwe, see Malmberg 2010.

[146] Browsing refers to eating leaves and young branches of woody species. The introduction of goats in the cattle system can increase browsing.

[147] Game cropping is the selective harvesting of game animals by shooting them on the range without affecting the reproductive capacity of the game stock.

of game farms. The construction of game farms involves heavy investment, for which no subsidies are available. Community-based natural resource management (CBNRM) appeared to hold promise for improving the livelihoods of the rural poor in wildlife-management areas with few other options (Arntzen 2003, Child 2004). Experiments are ongoing, but the final word on benefits is still out. On the one hand, revenues might have been overestimated as trophy hunters may not be interested to hunt in areas that also include human settlements and grazing cattle.[148] On the other hand, Namibia suffers from many of the same constraints as Botswana, yet CBNRM is doing exceptionally well there. A likely reason for the lack of success in Botswana is the nature of the user rights, under which, in normal circumstances, only 35 percent of the income from game cropping goes to the communities and 65 percent is deposited in a fund for financing community-based environmental management and ecotourism projects.[149] Since the running costs of CBNRM projects is well above the 35 percent retained by communities, it is impossible to generate a profit from this economic activity on its own.

Game capture as done on game farms in South Africa and Zimbabwe is only profitable when there are domestic game buyers, who are few in Botswana, or when game can be exported, which is currently illegal in Botswana (although it does happen). Game cropping for meat production requires special facilities (mobile slaughterhouses, cool transport etc.) and a sufficiently large market, both of which are lacking in Botswana at the moment. Studies are ongoing to develop modalities in which livestock production and wildlife management and utilization can go together.[150] Given the challenging situation and uncertain long-term future for a country that produces and exports small quantities of red meat such as Botswana, by global trade standards at least, wildlife and its association with tourism remain important economic diversification options for the future that should be preserved.[151]

11 Governance, margins and impact on smallholder farmers

11.1 Governance mechanisms

Value-chain governance refers to the vertical relationships among actors along the value chain that coordinate the range of activities required to bring the product from inception to end user. These relationships can range from spot-market transactions over contracts to vertical integration. Governance is about power and the ability to exert control along the chain and at any point in the chain, and about the related aspect of how much of the marketing margin is captured. It relates to the organizations or institutions, regulations and their enforcers that set the parameters under which

[148] Personal communication with Mark Atkinson.

[149] Personal communication with Peter Lindsey and Dave Perry. See also Mbaiwa (2011) for a more detailed discussion.

[150] Under the Wildlife Conservation Society's AHEAD mechanism in the context of the Kavango–Zambezi Transfrontier Conservation Area (KAZA TFCA) which spans five countries: Angola, Boswana, Namibia, Zambia and Zimbabwe (Cumming 2004, Cumming *et al*. 2007).

[151] Tourism is one of the fastest growing industries globally. Ecotourism (especially the hunting/trophy sector on private game reserves) appears to have been growing fast in the last few years (Langholz and Kerley 2006). One wild African buffalo, for example, can fetch as much as US$35,000, the equivalent of 100 finished steers. With the technology that exists for breeding FMD-free buffalo, the chances of introducing the disease into farming areas is negligible (Bishi and Kamwi 2008). A study into the economic, social and environmental benefits of wildlife, especially relative to livestock, is urgently needed for the semi-arid zones in Botswana.

the value-chain actors must operate (including safety and quality standards). It is about information exchange, learning and credit provision. It is about creating shared value.

For the Botswana beef value chain, governance thus refers to the relationships between buyers (BMC, butcheries, other beef processors), sellers (cattle farmers, feedlot operators), service providers (speculators and agents, veterinary services, abattoirs, input suppliers, banks, extension services, support programmes) and regulatory institutions (DVS) that influence the range of activities required to bring beef to the final consumers, be it in local or export markets.

In terms of generic classification, the beef value chain in Botswana is currently producer driven (as opposed to retailer driven), i.e. it is largely the government driving the chain through the BMC, policies and programmes.[152] However, the government, in turn, is influenced by two opposing factors that are influenced by cultural differences between producers: (1) economical alignment with large commercial (mostly white) producers, a cultural minority with economic clout, to liberalize and intensify the beef value chain, mainly through feedlot operations; and (2) cultural identification with communal (mostly Tswana) farmers, a cultural majority with political clout, which prefers the extensive oxen system (Ransom 2011).[153] As a result, change through upgrading for higher-end market segments is constrained (relative to, for example, Namibia and South Africa) and Botswana keeps selling high-quality "natural" meat products into lower-priced domestic and export markets.

Picture 29: Competition at an auction facility

For Botswana's beef value chain to be economically, socially and environmentally successful, supply-chain coordination and integrity "from plains to plate" is key. However, for the larger part this is not the current situation. Producers generally do not know in advance where and when they will sell their animals. This is certainly the case for smallholder farmers. Even though beef production is driven by product specifications and in Botswana suffers from volatile quantities supplied, there is no utilization of forward contracts for farmers to produce weaners or oxen. This also means there are no contract-embedded services available to farmers (e.g. credit to buy inputs such as dry-season feed). Farmers sell when they can and when they want or need to, driven by their personal or environmental conditions, rather than on the basis of information from buyers. Even within the BMC, the largest player in the beef value chain, coordination between procurement, processing, distribution and sales is severely lacking.

The marketing relationship may be entirely ad hoc, with a farmer taking his or her cattle to a local village butcher and selling them on the spot. There is equally little coordination in the case of the larger butchers, who commission agents to go out with specific orders, to find farmers willing to sell to them and to then arrange for the transport of the cattle to the abattoir. Somewhat more

[152] Unlike most countries in Africa, Botswana declined all structural adjustment programmes advanced by the International Monetary Fund and the World Bank, which allowed the GoB to maintain a strong presence in the agricultural sector (Smoot 2006).

[153] The Tswana people, an ethnic group in southern Africa, make up 79 percent of the population of Botswana, while white Africans from a variety of ethnic groups make up 3 percent (https://www.cia.gov/library/publications/the-world-factbook/geos/bc.html).

coordinated in nature, the BMC uses a system of "bookings" for specific buying days to plan the flow of animals into its abattoirs, albeit without much focus on consistency by type of animal and without any long-term coordination with farmers. The BMC's buying agents have direct contact with producers and facilitate farmers in making a booking for when the animals they want to sell can be received. For farmers, this allows for some shorter-term planning as well, but at the same time it represents a higher transaction cost and risk option relative to selling into the domestic butcher channel, and rather than cash-on-delivery (COD) payments, farmers have to typically wait several weeks before getting paid.

The two key exceptions to this lack of vertical coordination are the DCP and feed-advance schemes of the BMC (contracts with feedlot operators) and the value chains of the smaller beef processors (Quality Meat, Senn Foods). Commission-based feedlotting under the DCP and the feed-advance agreements of the BMC are basically the only types of contracting taking place in Botswana's beef value chain. The use of modern supply-chain-management software in the largely vertically integrated smaller meat processors helps assure higher levels of coordination and value creation and extraction.[154] It should not be surprising that this study found indications that these are likely also the situations of highest profitability in the chain.

Alternative mechanisms for improving vertical coordination are largely missing in Botswana. As one example, auctions are only now coming into being.[155] Such auctions could provide important tools for price discovery by farmers (who currently largely have to rely on agents for price information – apart from the BMC's weekly published prices) and they could also improve marketing efficiency. As another example, unlike most of its competitors, Botswana does not have a national meat council. Funded through some sort of levy system, such a body could take on many tasks that would facilitate smooth value-chain operations across various stakeholders. These tasks could include brokering partnerships, mediation in sales disputes, providing market intelligence, promoting Botswana beef in export markets[156] and setting product and process standards for the industry that cover the entire value chain (e.g. for a "Natural beef from Botswana" standard[157]). Yet another example is the limited role currently played by farmer cooperatives, syndicates and associations in terms of improving marketing practices and links with buyers (e.g. the critical link between farmers and "their" BMC).

> *"If we really want to create value and well-being for African pastoralists, we need to find a way to tell the great story of* ***African rangeland beef*** *to its many consumers and to all the links in the chain* ***from plains to plate****."*
>
> - Martin Cooke,
> Deputy Director, Ethical Trading Initiative (in Cumming et al. 2010)

[154] One other form of vertical integration is that some of the larger producers own their own butcheries and sell part of their output through a vertically integrated channel.

[155] Namibia's MeatCo purchases some of its cattle through auctions.

[156] And in the domestic market, should the import of cheap, lower-quality beef be allowed.

[157] This standard could be associated with a promotional message such as "High-quality natural African rangeland beef from Botswana – Natural goodness from our plains to your plate." Much can be learned from the high-end coffee subsector, which works around value-chain-based themes with catchy names that, translating some well-known ones to beef speak, could for example be: "Let's talk beef,", "Relationship beef" or 'Cuts of excellence." For some background, see: http://www.sustainableharvest.com/relationship-coffee/let/general-program.

Highly coordinated and strategically designed supply chains in which all stakeholders, including the government, feel they are achieving their objectives, and in which they see themselves as partners trying to realize a common vision, are a necessary condition if Botswana wants to establish itself as a credible, reliable supplier of differentiated, healthy, high-quality beef products. The value embedded in the final product, including its social and environmental credits, are the cumulative outcome of what happens at each stage (from range management to in-store presentation). The current situation in which, for example, the DVS, farmers and the BMC seem focused more on achieving internal objectives than on partnering toward a common vision is a far cry from where it needs to be.

11.2 Pricing and margin distribution

As a product is produced and flows through the value chain to the consumer, value is added to it (or unintentionally deducted from it). The value-chain actors (who buy, own and sell the product) and the service providers (those who perform services but do not actually take ownership of the product) all claim a share of the final product value as a reward for their contribution at their stage in the value chain. The total value of the product should, therefore, reflect all the valued added by each player in the marketing chain, including their profits. A marketing margin is the difference between the buying and selling price at each stage, and consists of the costs and profits incurred. Marketing-margin distributions can be compared with those of competitors to identify possible competitive weaknesses. Removing costs at each link in the chain reveals the profit-margin distribution, which allows for an assessment of both the fairness of the distribution among the various actors (taking risk and market-power factors into account) and the presence of possible inefficiencies in the beef value chain that affect its competitiveness.

11.2.1 Pricing

In terms of pricing, the BMC's EPP model sets the bar, with non-BMC prices in the domestic market loosely determined by applying a variable discount to the EPP prices.[158] For farmers, the lower domestic market price is acceptable given lower rejection risks, lower transaction costs (including lower transportation costs, as animals are typically picked up close to or even at the farm) and COD payment, as opposed to waiting 1–3 weeks for the BMC to pay.

The BMC establishes prices for slaughter-weight animals weekly, based on prices communicated by email by the Red Meat Abattoir Association in South Africa. The EPP paid by the BMC seems to be around 90–95 percent of the price paid by abattoirs in South Africa, with the main difference being the cost of transportation.[159] The cost of transportation to the abattoir should be deducted from this abattoir-gate price to arrive at the net price received by the farmer. BMC prices are listed on their web site (http://www.bmc.bw).

The EPP-driven pricing structure gives Batswana farmers a guarantee that they get a price for their slaughter animals that is comparable to that received by their counterparts in South Africa. However, there are three distributional issues associated with this that may affect the fairness of the price received by the farmer. First, the South African price is based on meat produced more cheaply using growth hormones that cannot be exported to high-price markets such as the EU.

[158] Key informants and the authors' estimates indicate a discount of roughly 10 percent. As indicated, BMC prices in the red zone are 80 percent of the green-zone price.

[159] For example, comparing the highest and lowest price per kilogram of CDM paid by the BMC versus abattoirs in South Africa for a particular week (27/2/2012–4/3/2012): excluding the price paid for underweight animals (less than180 kg CDM), the values were US$3.49 vs US$3.66 (96 percent) and US$2.78 vs US$3.02 (92 percent), respectively. This also reflects differences in the valuation of the pula and the rand versus the US dollar. The exact formula was not made available.

Second, EPP for slaughter animals is not the same as EPP for weaners. Under the DCP, the BMC had to increase the price it paid for weaners going into feedlots dramatically before farmers responded to it. Live-weight prices for (male only) weaners at various purchase points are also published by the BMC. One way to assure EPP for weaner animals would be to allow their export to South Africa. One further factor to take into account in establishing a regional EPP for weaners is that weaners in Botswana may not have the same weight-gain potential as those in South Africa because of breed differences. Third, cattle supply into the BMC is far less reliable and consistent than into South African abattoirs (or abattoirs in most other exporting countries) and from this perspective full EPP payment to Batswana farmers may not be entirely justified. Consistency is higher in the weaner/feedlot system, which perhaps justifies relatively high weaner prices and production costs in commissioned feedlots. The combined net effect of these three factors is not clear, but the essential fact is that without sufficiently high farm-gate prices the entire beef value chain is based on shaky ground.

The BMC also uses quality- and time-differentiated prices which help improve the consistency of its supply. Prices for slaughter animals are based on CDM weight and quality grade. Weaner quality is determined by live weight and age (based on dentition – number of teeth). This pricing structure implies that low prices will discourage the supply of low-quality offerings (most notably animals of less than 180 kg CDM). It seems, however, from our feedlot profitability analysis that the difference between live-weight-based weaner prices and the CDM-based prices for slaughter-weight animals is largely insufficient to justify the cost of private feedlotting.

11.2.2 Margin analysis

In this section we compare the gross and net profit margins at each stage of the value chain in per kilogram live weight and CDM-equivalent terms. Bearing in mind that total profits depend on the scale of operation, these indicators measure the returns from beef in equivalent terms across value-chain stages and help compare profits for different value chain participants.

Gross margins

Table 34 shows the estimated gross margins earned by farmers, feedlotters and butchers, excluding capital recovery costs and other estimates of annual depreciation and overheads. This indicates that returns from beef are highest for the 80-cow cattle-post system at basic and improved management and for the 130-cow 6×6 ranch system with basic management. The margins from a small, 20-cow cattle-post operation are relatively poor and farm profits deteriorate with supposedly better (more intensive) management. In this regard, policy measures that help farmers increase their herd size would likely be a good way to improve the profitability of beef production, except that farmers are then constrained by the limited carrying capacity of Botswana's rangelands and disincentives to "upgrade" to more-intensive management.

Net margins

Table 35 shows the estimated net margins from beef. At the farm-level, these exclude the value of the standing herd but otherwise include all capital-recovery costs and government vaccinations. In these terms, most farm-level systems are unprofitable and yield much less income in per kilogram live weight and CDM-equivalent terms than other value-chain stages. Only the 80-cow cattle-post system at basic and improved management and the 130-cow ranch with basic management provide a positive net income. Given that Botswana's competitiveness in beef begins at the farm-level, these findings are a matter of serious concern and suggest that policy measures and investment strategies designed to restore the long-term profitability of farm production and encourage better farm management should be given high priority for the future.

Table 34: Summary of gross margins for selected value-chain activities, Botswana

	BWP		US$	
	per kg LW	per kg CDM	per kg LW	per kg CDM
Farm				
20-cow cattle post				
Basic	0.65	1.32	0.09	0.19
Improved	0.10	0.20	0.01	0.03
Advanced	(3.52)	(6.52)	(0.50)	(0.93)
80-cow cattle post				
Basic	3.95	8.05	0.56	1.15
Improved	2.85	5.47	0.41	0.78
Advanced	(1.20)	(2.22)	(0.17)	(0.32)
130-cow 6×6 ranch				
Basic	3.27	6.67	0.47	0.95
Improved	0.72	1.39	0.10	0.20
Advanced	(1.67)	(3.10)	(0.24)	(0.44)
Feedlot				
Commission operator (feed @ BWP1.82/kg)	1.04	1.93	0.15	0.28
Independent operator (feed @ BWP1.82/kg)	(0.61)	(0.61)	(0.09)	(0.09)
Independent operator (feed @ BWP1.22/kg)	1.04	1.93	0.15	0.28
Butcher				
5 carcasses per week	1.63	3.13	0.23	0.45

LW = live weight; CDM = cold dressed mass.

Table 35: Summary of net margins for selected value-chain activities, Botswana

	BPW		US$	
	per kg LW	per kg CDM	per kg LW	per kg CDM
Farm (total excluding herd)				
20-cow cattle post				
Basic	(1.07)	(2.19)	(0.15)	(0.31)
Improved	(1.34)	(2.57)	(0.19)	(0.37)
Advanced	(4.74)	(8.77)	(0.68)	(1.25)
80-cow cattle post				
Basic	3.25	6.64	0.46	0.95
Improved	2.24	4.31	0.32	0.62
Advanced	(1.73	(3.20)	(0.25)	(0.46)
130-cow 6×6 ranch				
Basic	1.12	2.28	0.16	0.33
Improved	(1.13)	(2.18)	(0.16)	(0.31)
Advanced	(3.29)	(6.10)	(0.47)	(0.87)
Feedlot				
Commission operator (feed @ BWP1.82/kg)	0.31	0.58	0.04	0.08
Independent operator (feed @ BWP1.82/kg)	(1.34)	(2.47)	(0.19)	(0.35)
Independent operator (feed @ BWP1.22/kg)	0.31	0.58	0.04	0.08
Butcher				
5 carcasses per week	1.10	2.11	0.16	0.30

LW = live weight; CDM = cold dressed mass.

11.3 Impact on smallholder farmers

While the story may be different for medium-sized and large cattle producers (communal-land or ranch-based), the 74,000 smallholders with standing herds of fewer than 150 head (i.e. 96 percent of all cattle producers in Botswana) have a hard time making money in the beef value chain. Often, farmers with smaller herds have to operate on less land per livestock unit. They are the least informed on market opportunities and prices and face higher transaction costs and risks. They face the greatest challenges and derive the smallest benefits related to EU-market-compliance measures. They benefit proportionately less from the various government support programmes. It is only by making it part of a livelihoods strategy[160] and through government programme support that rearing cattle is worthwhile for smallholders.

Smallholder cattle production is important not only for its role in the livelihoods of a large part of the population, but also because in the aggregate this group of farmers is responsible for roughly 50 percent of the annual cattle offtake in the country (and 50 percent of the BMC intake). Furthermore, they would play an essential role in building a differentiated image in the market place (they are an intrinsic part of the product story) and as such could make an important contribution to creating market value. Helping these farmers to improve their cattle rearing and selling capacities and providing incentives so that more of the high-quality meat they produce gets into more-rewarding markets instead of ending up in stew as part of local consumption thus makes sense from both a social and a competitiveness perspective and should be part of the overall value-chain strategy.

[160] Livelihoods here refers to the fact that, apart from income derived from their sale, cattle have value as a savings tool and a provider of manure (if kraaled), milk (limited, as these are not dairy breeds) and traction power (although this role has mostly been taken over by tractors).

PART IV Strategic analysis and recommendations

12 Vision for the subsector

As this report demonstrates, the beef sector in Botswana plays a multitude of roles. Livestock are still an integral part of the culture of the Batswana, and owning livestock is a way of life. Many people refer to the BMC as the body that brought their parents the affluence that allowed their children to study, and people are grateful for what the BMC, and by extension the GoB, has done and achieved. The government sees the livestock subsector as an important instrument to alleviate rural poverty and to increase food security in the country. It is prepared to pay a high price for this through public funding towards the sector.

There are, however, also critical voices in the beef sector. There are serious doubts about whether the current conventional production system is environmentally sustainable. Widespread erosion is reported. The veterinary fences are associated with dramatic reductions in the number of migratory grazers such as wildebeest, tsessebe and zebra. Some question whether commercial beef production, as currently practised, would be profitable without government support. The proponents of wildlife utilization show calculations based on experiences in South Africa and Zimbabwe that indicate that wildlife can generate far larger revenues on a similar land area than cattle currently do. The challenge is how to generate the most benefit for the most people from such a communal resource. From a business point of view it seems that there has perhaps been an overemphasis on the EU market, with too little market diversification. This might have overexposed the chain to risks associated with failure to meet the requirements of this market, as seen when Botswana lost access to the EU market in 2011.

In light of the above, stakeholders in Botswana's beef value chain will have to agree on a vision on meat production and on the role beef production plays in that overall picture. The GoB will have to decide on future land use: continuing with the Tribal Grazing Lands Act or finding other forms of land use, with more-balanced resource management in which beef production, limited crop production and wildlife all have a place and contribute towards a possibly more robust, less risk-prone and ultimately more profitable resource-use system.

A vision provides the objectives for the value-chain development strategy and should be realistic, quantified as much as possible and inspiring to stakeholders. Partly based on the latest NDP, the following is presented as a possible starting point for the development of a "2032 Vision for the Botswana beef value chain."

Our vision is of a highly competitive beef value chain that:

- produces, in harmony with wildlife and from a national herd of four million head of cattle, 125,000 tonnes of beef annually, of which 100,000 tonnes are exported, generating US$600 million in export earnings;

- supplies a range of natural rangeland beef products that are globally perceived as meeting the highest standards of quality, safety, service delivery, social inclusion and natural-resource management;

- is characterized by a transparent, liberalized market in which the government's main role is that of facilitator and enforcer of regulations that are in line with the strictest global market standards, and in which well-informed, well-supported and well-organized farmers, from the smallest to the largest, can profitably sell into a wide range of markets, including the EU;

- is characterized by PPPs that are facilitated through a national beef council (or similar) and that drive continuous investment, upgrading and innovation using cutting-edge technologies and

management practices all along the chain, from range management, through breeding, cattle rearing and processing to marketing;

- is characterized by all stakeholders in the value chain sharing a common vision and continuously seeking ways to improve vertical coordination in order to create, capture and fairly share end-market value.

13 SWOT analysis

An analysis of strengths, weaknesses, opportunities and threats (SWOT) is used to provide an overview of the factors that need to be taken into account when developing a value-chain strategy (Figure 18). The essence of this analysis is that, while there is a long list of weaknesses and a shorter but equally serious list of threats, these weaknesses can largely be addressed in a short (five-year) time period and the threats can be mitigated to an acceptable degree. At the same time, there are vast market opportunities that play into the strengths of Botswana beef and that with the right strategies could be exploited (they barely are at presented). The main challenge is that the beef value chain in Botswana is currently in a self-enforcing downward spiral where one weakness leads to another. Reversing this trend will require a major effort that can be nothing short of a fundamental structural change to the value chain. In order to realize its potential, the stakeholders in the Botswana beef value chain will need to come together and tackle all core weaknesses simultaneously, relentlessly and persistently.

13.1 Strengths

Botswana beef could be presented as a unique natural product that is produced in an ecologically sustainable way, as it has been for centuries (albeit with emerging issues of bush encroachment and wildlife loss). It appeals to western consumers' wishes to eat products that are free from chemicals (such as hormones), meat produced by (largely smallholder) African pastoralist from animals whose welfare during their life was guaranteed and that were slaughtered and processed under controlled and clean conditions. Livestock production should not damage the environment and preferably contribute towards improved living conditions and happier lives for the producers and their families. The picture of animals in a feedlot does not support such an image; however, given that feedlotting is likely to be necessary to ensure the competitiveness of beef from Botswana it will have to be carefully integrated in a national natural beef standard (e.g. capped at 30 percent feedlot feeding, as in Namibia). Feedlot feeding can also positively impact the eating qualities of the beef from the consumer's perspective, a factor that should not be overlooked when trying to sell a high-priced, high-quality, origin-identified beef product.

13.2 Weaknesses

The many weaknesses of the Botswana beef subsector include the failing bolus-based LITS system, overburdened DVS staff, a strong dependency on and weak performance in the EU and SA markets, high costs (especially for feed), low farm productivity, poor support infrastructure and a serious lack of vertical coordination. Botswana's productivity indicators are lower across the board than those in other countries with similar ecological conditions, such as Namibia. Performance recording and analysis and profitability studies have rarely been conducted on the beef value chain. Understanding of the economics of profitable beef production in Botswana is poorly developed, partly because the sector is highly dependent on public financing to maintain essential services and infrastructure. Most livestock farmers use practices inherited from their fathers and are not aware of, or perhaps even receptive to, new insights and ideas or if they are they lack the financial means to implement them. Many livestock owners have other sources of income and are not dependent on income from their livestock. These farmers thus probably take a less proactive attitude to obtaining the best results from their beef enterprise. The bolus-based LITS system has not lived up to the promises made for it and is clearly not the best option for Botswana, either technically or

Figure 18: SWOT Analysis for the Botswana beef value chain

STRENGTHS	WEAKNESSES
• (Until recently) meeting the high EU market requirements • A cattle population with more offtake than needed for domestic consumption and thus potential for export • Cattle sector can present itself as based on free-range grazing, hormone free, with excellent hygiene and long shelf-life of cuts = "natural" image • Well-equipped disease prevention and control infrastructure – world-renowned Botswana Vaccine Institute • Political stability in the country and political support for beef production • Excellent environment for cattle rearing, with limited presence of diseases (never had BSE), strong OIE status (most of the time) • Sufficient skilled and competitive labour for the industry; Batswana have affinity with cattle, long history, strong traditions; good marketing story – "African pastoralist" • Top-notch processing facilities; already halal	• Failing LITS system (EU market exclusion) • DVS overburdened and not well equipped; poor extension services • Weak enforcement of standards in smaller slaughter facilities • Prevalence of diseases such as FMD and "beef measles" • Strong dependency on EU and South African markets and lack of buyer trust in these two markets (irregular supply; weak end-buyer links) • Limited carrying capacity of the land; land-use conflict between people, cattle and wildlife • High-cost structure: dependant on expensive imported inputs, high cost of domestic feed production, high utility costs • Lack of structured breeding programmes and thus product uniformity • Low farm productivity (calving rate, offtake, mortality) linked to market profitability, farmer objectives and commitment (culture vs competitive), skills and knowledge, transaction costs, market focus (no growth hormone) • Infrastructure poor and insufficient, leading to high transaction costs: access roads, marketing centres, watering facilities, central loading facilities • Lack of vertical coordination, low value-chain integrity, volatile cattle supply, unreliable beef supply to markets • High level of inefficiency in operations and marketing at the BMC linked to supply, firm structure, legal status, overcapacity • Heavy dependency on government support (distorted incentives, ineffective mix of social and competitiveness objectives) and support programmes not sufficiently targeted based on farmer needs
OPPORTUNITIES	**THREATS**
• (When meeting requirements) preferential market access to the EU for prime cuts – huge market relative to Botswana's exports • Regional market and alternative market opportunities for a wide range of products • Combining cattle keeping with agrotourism • Differentiated marketing strategy in export markets (branding, natural beef) • New Livestock Improvement Act (breeding) • Import cheap beef to export more quality beef • Fast-growing domestic market, growth of supermarkets catering to higher-income clients	• Possible outbreaks of highly contagious diseases influencing both beef exports and feed imports • Loss of preferential EU market access if Botswana does not sign an EPA before 2014 • Increasing competition on traditional markets by new actors in the international market (globalization, "Hilton quota") • Sudden loss of access to key export market(s) because of increased requirements • Bush encroachment, decreasing cattle carrying capacity of range • Recurrent droughts, destruction of range by fire, climate change • Loss of wildlife as source of economic wealth/income • Sudden increase in feed price or cutting off of imported feed supply • Unstable regional economies • Changing consumer preferences and demands (animal welfare, environment)

financially. As long as there is no user-friendly, manageable identification and tracking system with an up-to-date central database, the cattle sector will not be able to give the guarantees many clients require in terms of traceability.

13.3 Opportunities

Obviously, each of the listed weaknesses offers an opportunity for improvement. For example, there are various ways to increase productivity and thus production, such as by providing more-effective support and greater incentives for farmers to change their management practices. However, opportunities (and threats) are here seen as external to the system, as part of its operating environment. In this vein, there are many excellent end-market opportunities, as discussed in Section 4, especially if the industry can unite to promote the unique qualities of Botswana beef to higher-income consumer segments in export markets. The domestic beef market is also growing rapidly, and can absorb lower-quality or less-processed cuts, especially from small-scale producers who face high transaction costs in the export channel. Domestic and regional supermarket chains (there is little between the two) are growing even faster than the overall market and they sell beef products with higher value added to more-discriminating customers. Importing cheap, lower-quality beef may free up more high-quality Botswana beef for sale to high-income consumers in the domestic, regional and global markets (although this would require some safeguards to ensure that small-scale cattle producers can profitably access the export channel and are not wiped out by the imports). The new Livestock Improvement Act has changed the regulatory environment and may have a large impact on breeding in Botswana, and from there on productivity and the rest of the beef value chain.

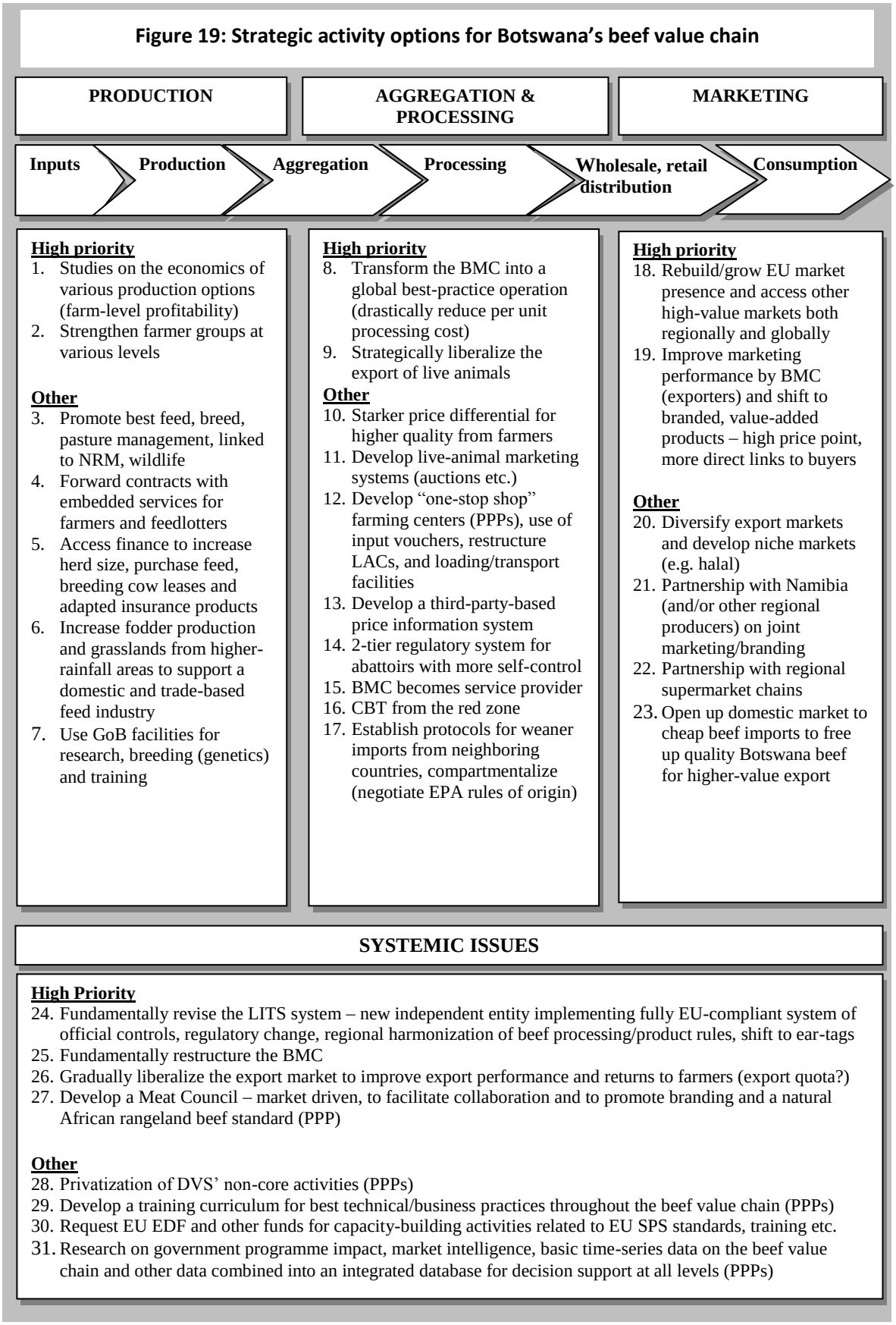
13.4 Threats

The Botswana beef industry is exposed to some serious threats that increase risk all along the chain. This implies the need for higher profits during normal times to fund contingency plans when unpredictable but sure-to-occur-sooner-or-later threats materialize. Again, this makes the analysis of profitability such an important aspect. An obvious example here is the (frequent) outbreaks of transboundary animal diseases such as FMD that lead to the sudden suspension of exports to the EU and to other countries following the same SPS rules. When such disease outbreaks occur in countries that supply feed to Botswana, these feed imports are cut off suddenly and Botswana currently has little means for coping with this (other than slowing down operations). Droughts are another recurrent risk that strongly impacts cattle production and creates a whiplash effect that makes the rest of the value chain difficult to manage. Bush encroachment is a risk that slowly erodes productivity over time. These various climatic and production-related factors are slowly eroding the agrotourism potential (e.g. wildlife) in Botswana, and thus slowly erasing an important potential income stream, especially for rural communities. Finally, markets change continuously, with consumers changing their preferences, competitors changing their strategies and countries changing their policies (e.g. the "Hilton quota" in the EU). This requires constant monitoring of markets, but the beef industry in Botswana gathers little market intelligence at the moment. One specific threat for Botswana is the possible permanent loss of preferential access to the EU market if the EPA between SADC and the EU is not signed by 1 January 2014.

14 Strategic options and recommendations

This section contains three parts. First, a number of core strategy options are listed. A core strategy indicates the main strategic thrust, i.e. a compelling theme that knits together otherwise independent activities and focuses the energies of the various stakeholders on what complementary strategic actions are needed in order to realize the shared vision. Since this vision has not yet been determined by the stakeholders, a broader list of core strategic options is presented here. Second, a graphic overview (Figure 19) is given of the 33 strategic actions to be considered. Their individual

Figure 19: Strategic activity options for Botswana's beef value chain



relevance depends on the core strategy and vision chosen, and on their interdependencies in terms of achieving impact. Nevertheless, the report indicates some activities that are considered high priorities because they address the weakest leverage points in the chain that, if not addressed, will have immediate, large and negative impacts. Many strategy elements also take on the form of PPPs, an approach that has already been successfully implemented in the Botswana beef value chain (Jones 2010). Third, each of the strategic activity options is discussed in more detail, providing some indication of cost, impact (how much, on whom, on what), dependency on complementary activities and which organizations would be likely drivers.

The following are core strategies (relative to the status quo) that can be considered:

- **Exit:** Abandon the beef value chain and redirect public resources to economic opportunities associated with wildlife that may be more rewarding. This will require extensive capacity building in rural communities and a liberalization of the trade of beef into and out of Botswana.

- **Volume driven:** Abandon the EU market (and its requirements) and focus on the domestic market and alternative export markets, especially in the region. This will allow drastic reduction in government support for the beef subsector. The will be on higher-volume, lower-margin trade based on location advantage, while the domestic market remains protected.

- **Differentiation driven:** Focus on differentiation based on quality and uniqueness ("natural rangeland," "African pastoralist") to become more competitive in high-end export markets such as the EU and market segments such as high-end restaurants, supermarkets etc. This will require continued investment and upgrading at all levels and a high level of value chain integrity, while the export market will be opened to broader private-sector participation and imports of lower-quality beef will be permitted to allow more high-quality Botswana beef to be exported.

Given the potential indicated in the SWOT analysis, this report recommends the third strategy (market differentiation) as the best option at this point in time.

Even with a core strategy chosen, there has to be sufficient flexibility in the specific elements of the strategy to adapt to the very distinct wants and needs of the various types of cattle producer. It is essential to take into account culturally relevant factors such as expectations, norms and daily practices when trying to upgrade the value chain (Ransom 2011). For example, smallholders may need more financial and capacity-building support, emerging medium-scale farmers may need more access to land and technology and larger-scale farmers may benefit most from policy changes and subsector-wide collaboration.

14.1 Production level

It is recognized here that the weaner system has shown its value in recent years in terms of improving the quality and amount of cattle supplies going into processing. The recommended general production strategy is a combination of the oxen system and the weaner/feedlot system, with the latter increasing further in importance over time. Within this context, the major constraints are high feed costs, low productivity and high fluctuation in the number of animals in the national herd as a result of a low level of management (linked to low prices, poor education and lack of information), genetics and effects of drought. The major interventions would be in the area of feeding, breeding, disease control, finance and land use/drought risk mitigation. In short, the interventions are aimed at bringing cattle and range under more intensive management in order to achieve higher levels of growth and competitiveness. Some recommendations are outlined below.

- Feeding

    - Strategic supplementation of breeding cows, not only with salt and dicalcium phosphate but also with licks providing energy, NPN and minerals. This will increase calving rate and weaning weight (but the economics of this need to be investigated).

    - Consider paddock feeding of weaners to maintain grazing but still allow a carcass weight of 200–220 kg to be achieved at the 0–2 teeth stage for the top class. As in Namibia, where supplementary feeding is capped at 30 percent of lifetime diet, this could be part of the GAP system. Again, there is a need to investigate the economics of this approach.

    - Make fattening loans available to resource-poor farmers, hedged by farmers' associations (although these are generally not strong) or by the buyer of the animal. This approach could be part of forward contracts, similar to the BMC's feed advance scheme.

    - Encourage the organization of cattle owners into cattle management groups per cattle post or neighbouring cattle post. Such organizations offer the advantages of being able to benefit from economies of scale in buying inputs or selling animals, and more-organized service provision, with possibly a veterinarian or veterinary assistant in charge of the animal recording, tagging/bolussing, treatments and vaccinations and their registration.

    - Explore regional partnerships for feed production in neighbouring countries such as Zambia and South Africa to reduce supply risks and reduce prices. Such partnerships could be at the business level (e.g. forward contracts) or at the government level (e.g. trade facilitation measures/agreements).

- Breeding

    - Pay more attention to the mother line. Maintaining availability of Tswabrah breeding cow with the right genetic make up to maintain maximum heterosis would require stratification of the production system, i.e. some producers would produce F1 breeding cows for sale to other farmers. If this approach is not possible the adoption of a synthetic breed (e.g. Beefmaster, Santa Gertrudis, Bonsmara, the recently released local Musi synthetic breed[161]) as mother line should be considered.

    - Promote on-farm (re)production recording, either on the whole cow population or on individual animals that are individually identifiable to facilitate selection and adjustment of management. Extension services can develop simple farm record books and ear tags, which are an EU requirement and would help in this process of on-farm recording.

    - Encourage more controlled use of bull lines, whereby suitability to local conditions should be paramount. This will require more local performance testing of bulls and bull mothers to identify the best-performing blood lines. An important role in this would be played by the Botswana Cattle Breeding Society and the Department of Agricultural Research of the MoA in the context of the recently approved Livestock Improvement Act. Farmers should be direct participants in this research.

- Land use/ drought mitigation

    - Replace annual grain crops with perennial grass/pasture that can be used for hay-making in years with good rains and as emergency grazing in bad years. Economic returns for

[161] See http://www.mmegi.bw/index.php?sid=1&aid=166&dir=2011/September/Thursday8 for further information on the Musi synthetic breed.

perennial grass are assumed to be higher than for grain production,[162] for which the state pays for all inputs every year. Local researchers have identified suitable *Cenchrus* varieties for this purpose. These can be combined with the knowledge and seed base on this subject present in South Africa to start pilot programmes. Further improvements can come from innovative approaches such as the use of microbial fertilizers for grasslands. This would also reduce public expenditure as such pastures are perennial.

- Explore the possibilities to develop holistic range management principles without fencing but with herding. This fits in with the overall drive to intensify the management of animals. The Africa Center for Holistic Resource Management has developed examples in the Victoria Falls communal lands (Malmberg 2010).

- Create/strengthen producers' associations/cooperatives, which lease land from government and can salvage breeding cows during drought crises and maintain them on holding grounds (e.g. state ranches leased for this purpose).

Three qualifications to the above recommendations need to be mentioned.

First, before these recommendations are integrated into revised extension messages, their economic validity must be tested and demonstrated. Our profit analysis, for example, found that using more licks does generate more revenue but not enough to offset the additional costs, at least not at current cattle prices and under the assumptions made. Related elements to take into account are how to finance the upgrade and how to manage the risk. In other words, these supply-side recommendations are only meaningful if they are associated with market access that is sufficiently profitable and not too risky.

Second, thought needs to be given to how to deliver this extension message and how make it realistic for farmers to take up the advice. One key option recommended here is to develop "one-stop shop" farmer-support centres with connections to both input and output markets. These centres would combine the various elements that are already out there (e.g. LACs, auctions, DVS offices, agro-dealer shops, BMC field offices, loading facilities, truck disinfection sites) and expand them (e.g. add banking and insurance services, price information points, drought emergency kraals for brood cows, a local farmers' association office etc.). These centres are envisioned as PPPs with, for example, the extension message coming from both public officials and private-sector employees (agro-dealers, private vets, breeders). Such farming centre PPPs could simultaneously reduce public expenditure and improve overall performance, and would provide a practical activity for the public and private sectors to work on in the context of realizing a common vision. The location of these centres would have to be carefully chosen so at to optimize accessibility and minimize transaction costs. Good road access to the centres for both suppliers and buyers would be needed.

Third, the question of which farmers to target when and with which specific support programme must be asked and answered. Ranchers and large-scale cattle-post farmers may not need any support programmes, although these farmers are the foundation for a modern beef value chain and are thus essential to any competitiveness strategy. Emerging market-oriented small- and medium-scale cattle farmers may be the most responsive to such programmes and should therefore be the first target of any competitiveness support strategies. For small-scale farmers who keep cattle as part of their livelihoods strategy and who are only loosely connected to the market, the support may be more social in nature, even though as a group small-scale cattle farmers are also important from a competitiveness perspective given their large role in overall offtake and in terms of end-market image ("African pastoralist"). The choice of target groups is largely political and is also linked to

[162] This difference in economic performance needs to be demonstrated by research. However, given that perennial grass does not need ploughing, will always produce something, even in drought years, and produces 800–1500 kg of hay per ha per year (in good years), demonstrates the potential of perennial pasture.

the vision for the beef value chain. At any rate, for support programmes to be effective they have to recognize the heterogeneity among farmers and will have to be customized and targeted. For example, personalized input vouchers have been used for many years in Africa to promote competitiveness or social objectives and this approach has become cost-efficient through the use of cell-phone technology. These voucher schemes are typically phased out over time and replaced by commercial relationships.

14.2 Trade and transport level

Farmers in Botswana have a limited choice in terms of to whom to sell as there are no livestock markets where supply and demand meet. Most animals are sold either to a BMC agent or to agents buying for butchers. After a drought many female breeding animals is sold between individual farmers, but not through markets. Livestock transport is now all motorized. There are, however, concerns about the central loading facilities and the need for veterinary control and inspection, which could be mitigated quite easily. Some recommendations in these areas are outlined below.

- Livestock markets

    - With the increasing number of beef operators in the country and possible future changes in the export monopoly it is important to offer farmers a place where they can sell their animals to the highest bidder, instead of the current system in which the BMC stipulates its price and all other buyers set their price based on this. This price can continue as an indicative minimum or reference price. If the BMC's export monopoly is removed perhaps this responsibility should be transferred to the MoA as a more neutral forum, with a transparent use of clearly defined formulas; EPP prices could be communicated along with livestock (auction) market prices using cell-phone technology to make price available frequently (e.g. daily or even real time).

    - Consider opening up the border for the export of weaners if there is a significant difference between local market price per kilogram live weight and that offered in South Africa. (In May 2011 this difference was reported to be roughly a factor 1.5.) In this way there will be not only EPPs for slaughter stock but the weaner price will move towards a parity price with the South African market. The anticipated supply response from producers would make more cattle available to the BMC if it implements an appropriate price-response strategy for both weaners and finished cattle (to assure profitability at both farm and feedlot level). Thus, even though allowing farmers to export weaners directly (e.g. through auctions as is the case in Namibia currently) might increase exports of weaners this could result in Botswana's beef value chain adding more value than at present. The BMC (and other exporters if/when they emerge) would have to assure their profitability under this price structure through operational efficiency and through securing higher end-market prices for the higher-value ("natural") beef from Botswana.

    - Create regular markets for breeding stock and experiment with the production and sale of F1 breeding cows according to more-controlled breeding conditions with e.g. certification from the recently started Botswana Cattle Breeding Society. With such a stratification there will be a clearer role and economic purpose for the few pockets of reasonably pure Tswana and Tuli cattle remaining.

    - One more radical option for increasing weaner supplies to abattoirs would be to import cattle from Zimbabwe if they could be raised just across the Botswana border near Francistown. This may also reduce the illegal trade (which carried FMD risk) that is already taking place given higher prices around Francistown BMC abattoir. However, this would require significant investment in Zimbabwe and may be politically challenging given that Zimbabwe's abattoirs are operating far below capacity. Importing weaners from Namibia may be a related option.

- Livestock transport

    - Central loading facilities should only be used to collect animals from small producers to fill a large double-tier truck and trailer, as was suggested in 2009/10. Animals should be scanned by the DVS on site, small trucks should disinfected before leaving the site and animals with a bolus and movement permit would be sent to their final destination.

    - Start a system of training and licensing of drivers, as per EU regulations for livestock transport, and of registering transport companies that will be allowed to cross zonal borders. If a truck obtains a full load of animals belonging to one owner on one farm it should be allowed to bypass the central loading facility if the licensed driver has a scanner and checks that all animals being loaded have a bolus. A cross-check would be made on the point of offloading by DVS. Any non-compliance would have repercussions for the licence of the driver and the registration of the transport company. In this way animals would lose less weight, have less bruising and suffer less from transport stress. With the ever-increasing coverage of mobile phones and capacity of the ITC, drivers could send the data on the animals to be transported through to a central cattle-movement and registration point and receive an electronic movement permit that any official of the DVS can check within the MIS/LITS.

    - Instate a number of licensed washing and disinfection sites for cattle trucks, where a DVS employee would inspect and certify cleanliness and effectiveness of disinfection. Cattle trucks would not be allowed to travel empty without a recent cleaning and disinfection certificate and when transporting cattle should have a certificate not more than, say, two days old.

14.3 Slaughter level and the BMC

Controlled slaughter (abattoir registry, inspection by the DVS) is not only good for public health and animal welfare but would also provide a better instrument for measuring total meat production in the country. All slaughtering should be reported to ensure that the LITS system is up to date. Currently, many animals are still slaughtered outside established and registered/licensed premises. This undercuts the formal full-cost price in the market and poses a public-health threat. When slaughter houses have working HACCP systems the level of inspection can be reduced, freeing inspectors to tackle the issue of animals slaughtered "informally". The following are some recommendations:

- Until the 2002 Food Law, the EU had a two-tier system of requirements: one for large companies with HACCP, and one for smaller operations (fewer than a set number of animals slaughtered per week) with good practices. The Botswana MLIA and its subsidiary laws created one level of compliance for all firms. While this should be the ultimate goal, it is more realistic to develop GMPs with SOPs for the smaller slaughtering slabs and slaughter facilities, with these regulating basic hygiene, pre- and post-mortem inspection, operational processes and the handling of waste.

- Run updated training courses for the meat industry and trade, perhaps in the Meat Training Centre in Lobatse, in which a curriculum based on the requirements of the hygiene package is taught. Progressive meat processors will want to send their workers to such a course. These training centres could become part of a possible future Meat Council of Botswana and be expanded to also include training for transporters (see Section 14.2), training on grading, pricing, financial management production and rangeland management for farmers, veterinary staff and extension staff. Namibia has implemented such a training programme under its Northern Regions Livestock Development Project (Bishi and Kamwi 2008).

- The BMC has to decide whether to go into further product development (customized cuts for current customers) or remain with slaughtering and deboning and provide slaughter services. The first option would require considerable investment, for which the BMC does not funds and may find challenging to mobilize such funds, and end markets with reliable return clients, of which the BMC has very few. The second option would require clients who have a vested interest in slaughtering in an EU-licensed slaughterhouse. Clients would pay for this service only if they had the right to export beef and beef products. In this case the BMC could continue to play its role in feedlotting (DCP) and the sale of EU-eligible carcasses to other operators who have the right equipment and conditions to prepare a final product.

- With the freeing up of inspectors when companies develop their own audited and working HACCP (self-regulatory) plans, the DVS should intensify the control of illegal slaughtering.

- It is inevitable that Botswana must start to sell some of its beef into markets other than the EU, even though it regained access to the EU market in August 2012. Botswana would have no preferential access to these alternative markets, and prices are likely to be lower. This means that the production cost of beef and the overhead costs of slaughter and processing will have to be reduced drastically in order to maintain profitability. It is questionable whether a parastatal monopoly would be able to reduce overhead costs for slaughter and processing unless pushed to do so by the real farmer-owners of the enterprise. Farmers will respond to marketing and price signals and increase the productivity and production when there is a price incentive. There is therefore much debate on how to change the BMC Act, how to restructure the BMC through a reformulation of its functions and tasks, and how to improve the production support systems, with a focus on reducing the agency's entire cost structure in terms of staffing, salary levels, other personnel costs and other overheads, while still delivering maximum benefits to all cattle farmers in Botswana.

14.4 Processing level

According to the DVS list, only three specialized entities process meat in Botswana, but in reality there are more meat processors in the country. Most lack the equipment and know-how for modern cutting, processing, packaging and labelling.

"The BMC is traditionally very good in the manufacture of Ford Cortinas. The problem is that nobody buys such cars anymore. I mean to say that the kind of product the BMC brings on the market is no longer what today's market requires."

– Anonymous within BMC

Supermarkets are rapidly becoming the principal source of meat for urban consumers. They might soon require more information to be put on the labels, such as dates of processing/packaging and product expiration. Most meat cannot be traced back to source, although in principle that should be possible given that all cattle slaughtered in Botswana have a bolus with unique identification number. Some elements of the bona fide processing sector seem not to comply with the existing rules and regulations. Some recommendations to improve this sector are as follows:

- Botswana's meat processors, along with all other stakeholders along the value chain (from input providers to retailers) and the government, could establish a mostly private-sector-driven Meat Council of Botswana. The government could facilitate the emergence of such a council, often also called an inter-professional commodity association, but would typically have only one seat on the board, with or without voting rights, and the private sector would be in the

driving seat.[163] Such a council or association provides a platform for facilitating collaboration both between the public and the private sector and within the private sector in order to execute certain common-interest tasks. These tasks might include, for example, the administration of LITS, which is currently not up to the required level, and brand development and promotion, with a joint promotion of Botswana beef in the world under a Botswana brand name. A Meat Council of Botswana (or Meat Association or Meat Board) could also tackle new export market studies, trade agreement negotiations, explorations of stronger collaboration with Namibia on aspects such as securing feed and marketing, and so on. Such a council could be financed from a levy per animal slaughtered, with additional income from export levies. In this scenario, the government would gradually withdraw from supporting or executing certain tasks, but remain a member of the council.

- The rules for labelling and standard information on them could be strengthened, and the Botswana Bureau of Standards and consumer bodies could play a role in this. The existing legislation for labelling could be gradually brought in line with existing EU requirements in anticipation of export of meat products packaged ready for consumers.

- In many countries the industry has set up collective schemes for processing by-products (intestines, bones) and rendering waste and unusable slaughter offal and carcasses. A feasibility study should be conducted to determine to what extent there is a need for such schemes in Botswana and how large the uptake would be. Bone meal, if sufficiently heat-treated, can be safely fed to cattle instead of dicalcium phosphate in areas where BSE never occurred, such as Botswana. The EU is also currently discussing the possibility of including bone meal in livestock feed once more.

14.5 Market level

14.5.1 EU, yes or no? Or not only?

As previously discussed, more suppliers are coming on the EU market with conditions similar to those enjoyed by Botswana (tariff free), although with a quota. However, the quota of some suppliers exceeds the total export volume of Botswana. Prices fell on the European market for more than a decade following the EU reform in 1992 and as more suppliers of beef became able to meet the requirements and standards. Although prices have increased in the last few years, this trend could be reversed in 2015 when the end of the milk quota could lead again to an increase in slaughter animal numbers in the EU (until structural adjustment in herds is completed). The requirements are becoming increasingly stringent: in an effort to avoid unfair competition between locally produced meat and imported meat, the requirements imposed on EU beef producers in terms of quality and safety are being imposed on producers of beef for import. The increasingly demanding environmental and animal welfare rules, in particular, could become challenging, especially with feedlotting and the long-distance transportation required for Botswana.

On the other hand, there are some factors that still make the EU market attractive. Brazil, struggling with EU market-entry requirements, has dramatically reduced its exports to the EU, and now accounts for only one-third of total EU imports (down from two-thirds). Botswana is, in relative terms, a small exporter to the EU and even if it were to double its exported volume, the EU market could easily absorb it. Botswana has a long history of exporting to the EU (the United Kingdom especially) and is a known entity on the market. Botswana is still one of the few countries with preferential access to the EU, and unlike the larger players it can offer a differentiated beef product targeting high-end consumer niches. Finally, other markets Botswana may target,

[163] For more on commodity associations, see Shepherd *et al*. (2009).

especially the higher-priced ones, are increasingly demanding compliance with the same rules as the EU and Botswana does not have preferential access as it does to the EU market.

The overall conclusion is that the EU market remains a key market for Botswana's beef. Even as Botswana's advantages to market entry are eroding and competition increases, it still offers the best value/volume option for Botswana, especially if Botswana can move to a higher value-added beef product.

This leads to the following recommendations:

- Botswana could shift away from beef *commodity* trading, in which it is hard to compete with countries that have a larger trading volume and that can better group and guarantee a steady supply than Botswana, towards beef *product* trading: branded products prepared according to the specifications and requirements of an end-market client and not those of the intermediary trade. This implies an important shift from public EU standards to the even more demanding private standards of retailers or food-service providers, but also greater value added to the product. Penetration of Namibia's Meatco's on the Danish market for such products is an example of such a development. A product with credible sustainability qualifications is increasingly what markets want.[164] In this context, Botswana, perhaps through a Meat Council, should consider becoming a member of the Global Roundtable for Sustainable Beef, founded in February 2012.[165]

- In a way, the EU requirements could be seen less as a burden but more as a challenge to remain at the highest process and product standards and as such have easier access to other export markets setting the same demands as the EU. The national rules in Botswana could be harmonized with the international (EU) requirements with the buy-in and compliance of value-chain stakeholders. The LITS system could become a system that functions as a management tool for farmers and not just a system to satisfy DVS inspection requirements. Domestic consumers have the right to know where their meat comes from and how it is produced, just like consumers in the EU.

- Many countries are trying to convince international bodies (e.g. OIE/WTO) to adopt commodity-based trading (CBT), i.e. to shift from a system that guarantees that beef comes from a disease-free zone to one that guarantees that the product is free from the virus causing the disease through some form of processing.[166] If or when that happens, Brazil and other South American states will be able to export cattle from many more zones than they can at present. Countries such as India and Ethiopia have made considerable investments in their veterinary services and would probably be able to comply with the rules of CBT. Therefore, it may not be in Botswana's interest to support the lobbying for CBT: the benefits of being able to export beef from Ngamiland under CBT would be lost as a result of the expected drop in prices in the EU market without any relaxation of the requirement for stringent movement control, identification and registration and FMD vaccination. CBT would make sense for Botswana if the country can establish itself as a preferred supplier of higher-quality cuts to buyers in the high-end segments of export markets, as these buyers would probably not buy the lower-quality products that would make up most of the increase in beef available under a CBT system. Moreover, preferential access to EU markets is also only accorded to fresh meat, not processed meat such as that covered by CBT. CBT, with its far lower compliance costs (e.g.

[164] This drives a lot of the strategy of leading agrifood firms such as Mars, Unilever, Starbucks and Wal-Mart.

[165] See http://www.sustainablelivestock.org/ for more detail.

[166] Namibia is looking into this option. More background can be found in DFID (2007) and Rich and Perry (2009, 2011).

less or no quarantine needed) may be an interesting option for supplying the domestic and regional markets. Either way, CBT would require investment in the establishment of processing plants, but if combined with effective HACCP-based risk assessment and independent certification, this scenario could offer real opportunities, especially for poorer producers in the red zone.

- Although the overall idea is that the IEPA gives quota- and tariff-free access to the EU, the "I" (for interim) in the term is becoming a problem: Botswana will lose its privileged access to the EU markets if SADC has not ratified the EPA by 1 January 2014. Botswana and SADC will have to carefully analyse the costs and benefits of ratifying the EPA. With the rapidly changing geopolitical economic constellation there might be other profitable alternatives than those offered through attaining ACP status.

14.5.2 Other export markets

Botswana's dependency on the EU and South Africa markets is worrisome, especially given poor recent performances (exclusion from EU, lack of trust in South Africa). There are excellent market opportunities across the world, offering many market diversification options. For Botswana, the most interesting opportunities appear to be:

- Switzerland (high-value and sizable market) and Russia (this may be an option given its huge size and tendency to shut out key existing suppliers on SPS grounds);

- the Middle East – particularly Bahrain, Egypt, Iran, Iraq, Qatar, Turkey and the UAE (exploiting Botswana's potential to produce halal beef, these markets offer some of the best growth opportunities, reflecting fast growth and high value, with the exception of Egypt and Turkey, which are more interesting for their size although even there Botswana could focus on the upper end of the market); and

- markets in Africa beyond South Africa – Angola and Congo are the largest, but also the Comoros, Equatorial Guinea and Mauritius hold promise (African beef markets are not only growing fast; Botswana should also have a comparative advantage in them, based on location).

Partnerships with South Africa's spreading supermarket chains[167] and food-service providers to high-end hotel chains and direct investment should also be considered as options in an African expansion strategy for Botswana that would focus on supplying a European style and quality of beef cuts. At the other end of the market spectrum there will at times be possibilities to market lower-quality "ration beef" when countries run short of supplies or when highly populated areas with buying potential (coastal cities, industrial and mining zones) are looking to increase their supplies.

One further strategic option to consider in this context is a partnership with Namibia on accessing export markets. Even though the two countries have over the last decade drifted apart after existing market collaboration gradually disintegrated, there seems to be great potential in finding a new collaboration format. Namibia has gone through interesting market experiences in terms of upgrading along the value chain with branded and differentiated products and as such can bring great insights to the partnership. On the other hand, Botswana, as Africa's largest beef exporter, brings a volume to the table that could facilitate accessing more markets, more smoothly. Both would benefit from network externalities and economies of scale and scope in marketing. For example, Batswana and Namibian beef exporters could join forces in establishing regional marketing agencies in Angola, the Democratic Republic of Congo and elsewhere to jointly market

[167] As well as Botswana's own regionalizing supermarket chain Choppies, which is rapidly expanding in South Africa.

beef and establish reliable supply chains in these countries. Such collaboration does not need to be restricted to marketing only. Specialization, with Namibian weaners fattened in Botswana for the EU market, would be another possibility (if not restricted under the existing EPAs).

14.5.3 The domestic market

The domestic market is on a clear long-term growth path and represents a key growth opportunity for cattle farmers of all sizes of operation. The competitive position of "official" meat on the general market will improve once the government brings currently uncontrolled and illegal slaughter under control. Continued improvement in packaging, labelling and presentation is required. With the expected growth of population and incomes, and the associated increase in meat consumption, this market might take up an increasing share of the annual kill, especially in years in which the national herd is being rebuilt after forced destocking during drought years.

Importing frozen beef is currently banned. Even if this ban were lifted, imports would be subject to the 40 percent SACU import duty on beef, which protects not only Botswana's domestic market but also its exports to South Africa and other SACU countries. However, overturning this import duty and lifting the ban on imports of frozen beef could represent an interesting and logical strategic option. Supplies of beef for export are gradually drying up as demand increases on the local market. In consequence, there is little point in investing lots of resources in developing new export markets. The supply of quality beef for export could be increased if beef could be imported cheaply from Argentina, Brazil or even India to cater to the large, growing and less quality-discriminating segment of the local consumer market. This would release more high-quality beef produced domestically for the higher-value export markets in the region and beyond. The response from the consumer, currently used to bone-in fresh beef even if less concerned about cut quality, remains an important unknown in this context. There is also the risk that cheap imports will force many smallholder beef farmers out of business by squeezing them out of the domestic market at the same time as high transaction costs prevent them from selling into the export market. The import of cheap beef, if pursued in this context, should therefore be combined with activities that facilitate the flow of smallholder beef through the export channel.

14.6 Support services level

The government has continued to perform all sorts of services for livestock owners, often free of charge. However, if government programmes were better targeted to address the needs of smaller-scale farmers, some costs could be carried by the already well-developed larger-scale cattle farms in the private sector. This would free up government funds and staff to concentrate on critical public tasks in the areas of control of animal movement, animal disease control and prevention and public health (meat inspection).

14.6.1 Input supply

Inputs for a viable business should be left to the private sector, not subsidized and handled by government bodies. The government can continue to support poorer farmers with inputs but should target this support more accurately, for example through a voucher system that allows poorer farmers to get the required inputs at subsidized price or free of charge, if really deemed necessary in times of drought. One (semi) private-sector solution would be to provide inputs to farmers as an embedded service in a contract with a buyer (most notably the BMC), which will deduct the costs of the input from the payment for animals supplied (similar to the BMC's current feedlot advance scheme and transport payment system).

The role of LACs should be more clearly defined. If the LAC is the point where the farmer meets the veterinarian and receives advice, business aspects should be handled by another party to avoid a conflict of interest. LACs could be leased out for this purpose to agro-input dealers from the major towns through a transparent tender procedure. This will obviously take away a profit stream from

the LACs, perhaps rendering some of the more remote LACs unprofitable (as a 2010 study found), but it may still make strategic sense in the broader context of the "one-stop shop" farmer-support centres discussed in Section 14.1. Some LACs may need to be relocated to carefully chosen locations and additional roads may be needed to achieve significant impact across the LAC network. Furthermore, some government support will likely remain necessary for the foreseeable future, and this may be one of the most effective channels for it.

The government currently invests large sums in encouraging farmers to produce grain. The business case for this appears weak and has yet to be subjected to an economic analysis. Indeed, grain production may not be sustainable (without government support) and may reduce the amount of land available for grazing livestock. Rather than continue to subsidize grain production, the government could conduct a "once-off" drive to encourage farmers to sow perennial pastures. After two years, farmers would have a permanent resource from which to produce dry-season fodder, which can be stored for bad years and generate good income, even for those without livestock, through sales. If there is sufficient re-growth, these pastures may also be grazed during the dry season. However, some land may have potential to produce good fodder crops and silage from feed sorghum and millet, and perennial pastures will yield less dry matter and have a lower nutritional value than such fodder and silage crops in the winter when it is needed most. There are indications that farmers are achieving good yields of hyacinth bean (*Lablab purpureus*), although more research is required on cultivation methods and development of fodder types that can withstand dry spells and erratic rainfall. Farmers should be direct participants in this research. The main conclusion is that government and private sector should collaborate to find the best way to meet feed demand of beef cattle and jointly invest more in research and development.

14.6.2 Veterinary services

If Botswana is to build a strong presence on the EU market and to improve the competiveness of its beef industry in general, a fundamental restructuring of the veterinary services is required, especially in the context of markets with increasingly stringent regulations (e.g. even non-EU markets requiring EU licences). Veterinary services that are effective in terms of traceability and compliance with export-market requirements are essential**.** The central concerns here are the failure of LITS (discussed in more detail below) and the mismatch between the tasks taken on by the DVS and its resources.

As in many other countries, veterinary services are becoming overstretched in Botswana, especially with FMD outbreaks and the need for control measures, including additional vaccination, movement control etc. The DVS must create a conducive environment for policy to accommodate the increasing challenges to the industry, such as the demand for traceability, control of veterinary medicines and drugs, enforcement of legislative requirements, increased border controls and, above all, changes in consumer demand. The workload of public veterinarians will even increase in future with the emergence of transboundary animal diseases such as Rift Valley fever (RVF) and peste des petits ruminants (PPR). Private veterinary practice is poorly developed in Botswana, except for domestic pets such as cats and dogs, largely because of the many free services and vaccines provided by the government. At the same time there are many complaints from farmers that it is hard to get hold of a veterinarian when needed to scan animals, prepare movement permits etc. Farmers who live in town and leave their animals with a herd boy, in particular, will have tremendous problems maintaining the EU-required farm records on numbers and movement of animals and on use of drugs and antibiotics.

These observations lead to the following recommendations:

- Privatization of non-core DVS activities. This requires a review of the activities and strategies of the department to determine which activities are not core. Some activities may have to be outsourced or privatized completely. This will have financial implications for farmers, as they would be expected to share some of cost for some of the services offered. The net effect of this change is that it will increase the costs of compliance for the farmers. Outsourcing and/or

privatization of some activities, which may include fence maintenance, are nonetheless inevitable.

- Plan for engaging private veterinarians or paraprofessionals at cattle posts and LACs. These people will be working both for the government (to perform certain publicly funded tasks) and for the farmers (at private request). If such a person has transport, his/her services can be shared among a number of cattle posts, each of which pays pro rata (according to the number of livestock) for the services not paid for by the government. The following are some examples of the potential tasks of these private-sector assistants to the DVS:

    - Tagging and recording of calves (see under LITS).

    - Administering and recording the use of veterinary drugs and antibiotics.

    - Treatment of sick animals.

    - Issuing of a movement permit after transmitting the numbers of the animals intended to be moved and receiving a "no objection" decision from the central registration and movement-control post (assuming mobile phone coverage or other means to transmit the message).

    - Fulfilling information supply, extension and advisory tasks within the operational area.

    - Facilitating the change by farmers from free to paid-for vaccinations (other than FMD and brucellosis) and making this part of the business for the private veterinarian against cost recovery. Farmers will have to be gradually prepared for cost recovery and a voucher scheme that is phased out over time would be an excellent tool for this.

    - Assisting with the execution of the country's contingency plans for when there are disease outbreaks that need to be controlled. Most countries in Europe have now developed public–private animal-health funds that can fund the immediate implementation of the necessary actions, and Botswana should look into setting up a similar system.

- Preparing contingency plans for RVF and PPR, with the assistance of the Regional Animal Health Centre, and updating the plan for FMD in line with the Progressive Control Pathway for the control and eventually possible eradication[168] of FMD by the year 2020.

14.6.3 Livestock Identification and Trace-back System

The LITS system should not be only the entrance ticket to the EU and other export markets, but also an integral part of the overall livestock management, tracking and tracing system between farm and fork, including playing a key role in disease management. This means that the LITS system should become "visible" to farmers and become a management tool for farm recording. The clear failure of the current system, especially in terms of operationalization, as discussed extensively in this report, implies a strong recommendation to change to a far more robust system. The following changes are suggested:

- As a first step that can be implemented relatively easily, young calves should be identified with double ear tags (replacing the bolus) with RFIDs (so that existing scanners and systems can continue to be used). Ear tags with numbers that can be read visually and allow for individual animal recognition are important as a day-to-day management tool for farmers.

[168] Although there was initial talk of eradication of FMD this has now been omitted and control is the goal.

- As a second step, personal digital assistants and third-generation communication technology (e.g. smart phones) can be used to link the tags to a new central LITS database that will be equipped with voice response functions so that farmer can self-report over the phone.

- More-fundamental change is required to tackle root problems in this critical area. To address the resource constraints at the DVS, as well as the conflicting dual role played by the DVS of being both the implementer and auditor of LITS, it is recommended that the government consider giving the implementation role to an independent agency, recognized under a new legislative environment and with a governance structure that reflects a true public–private partnership nature.[169] This new organization would cost-effectively manage a reliable and up-to-date database (receive, process, analyse and report data) and provide customer support, while value-chain actors would be legally required to enter data into the system, which could be done using internet and cell-phone technology.[170] It is important to note that this move to a new entity should also include the handling of health information (vaccinations, movements and medical tests of animals) and as such represents the establishment of a new and fully EU-compliant system of official controls.[171] The change would allow the DVS to focus more of its resources on auditing the system. The new operator could be funded through levies and ear-tag sales, and given its public role could be justifiably funded in part from public funds. This independent operator should also be closely linked to (yet remain managerially independent of) the proposed Meat Council of Botswana in order to facilitate coordination between LITS and stakeholders throughout the value chain. The new system could initially focus on cattle, but could later be expanded to include other livestock and even farmed wildlife, and could play an essential role in biosecurity (disease monitoring and outbreak management). This change would require clarification and communication of the increased responsibilities of the value-chain stakeholders (breeders, farmers, traders and processors) and an associated government-funded programme of capacity building, especially for smallholder producers. A cutting-edge example of such a model is the recently established National Animal Identification and Tracing (NAIT) system in New Zealand.[172] New Zealand could be asked for assistance in establishing the system described above.

- In line with the previous strategic option, once a system of certification of specialized livestock drivers and licensing of their companies is in place, certified drivers operating trucks with loads from one or two farms could be equipped with a scanner and permitted to scan the ear tags of animals as they are loaded. The records would be checked by someone from the DVS when the truck arrived at the location where the animals will be offloaded.

14.6.4 Extension

Extension services were traditionally the instrument to bring new technologies to farmers. Increasingly extension services are becoming facilitators for farmers to better understand their business and run it optimally. Financial data are important in convincing farmers to adopt new

[169] The system proposed here is already being discussed by stakeholders and appears to have support from both the private and public sector. To distinguish it from the current system, and to stress the fundamental nature of the change implied, it is being referred to as the Botswana Livestock Identification and Tracking System, or BLITS.

[170] Some smallholder cattle producers may need to be assisted in cattle registration by DVS field officers or field support staff from the newly established LITS implementing agency.

[171] This could be done by DVS-certified private veterinarians working with the private sector.

[172] For a description of NAIT, see GoNZ (2012) and Barnes and NAIT Project Team (2009). For the legislative background, see http://www.nait.co.nz/, http://www.legislation.govt.nz/act/public/2012/0002/latest/whole.html.

approaches: "what if" scenarios, in particular, are powerful tools to convince farmers of the value of certain interventions.

There is an urgent need to develop a better database on economic data related to livestock production. Spreadsheet models such as those we developed for this study can help in this. The farmers employing holistic resource management use a software package to monitor their enterprises in terms of costs per MLU, per hectare and per kilogram of beef produced. Only with such models can interventions be checked for their expected result on the targeted production system. Although frequent reference was made to economic ranching models, no such model could be found during this study.

Extension requires that clear messages be transmitted to farmers. These are usually complex and cover multiple disciplinary areas. Areas where extension is required include on feeding, breeding, farm economics, marketing and farmer collaboration/cooperation. Recommended approaches for delivering extension messages include the "one-stop shop" farmer centres and the training curriculum. PPPs appear to offer the best opportunities for delivering extension messages.

14.7 Policy level

There are a number of drivers for policy change. One is the 2008/09 global economic crisis, which left Botswana (temporarily) with far less income than normal from minerals, its most important source of revenues. In turn, this led to budget cuts and a lack of funds to maintain the level of public funding in the livestock sector. Another driver is the current set of problems in the beef chain, such as a low profitability, caused by variety of factors, and exclusion from the EU market. Combined with increasing competition on the world beef market for the type of product Botswana produces, this has led to uncertainty about the long-term prospects for the Botswana beef chain.

The following are some of policy-level recommendations (in addition to the policy implications associated with previous recommendations):

- The EU provides structural funds to help its producers keep up with the ever increasing requirements for SPS and food safety. With the EU's policy emphasis on "aid for trade," Botswana could request financial support under the EU's 10th European Development Fund (EDF) programme. This could be done through SADC's Trade, Industry, Finance and Investment (SADC-TIFI) department for all SADC member states that export beef to the EU. This funding could entail support to the DVS or provision of concessional loans through the European Investment Bank to companies in the meat industry that want to invest in meeting EU food safety, SPS, animal welfare and/or quality standards.

- Within the context of SADC-TIFI, it is important to facilitate regional trade through the harmonization of regional standards based on regional realities and in line with general international standards (see COMESA [2008, 2009] for a discussion). The meaningfulness of adopting EU standards for regional trade depends, from Botswana's perspective, on the country's ability to be profitably competitive on the EU market.

- To address the problem of a declining government budget and still maintain the current level of services, the government could initiate a system of cost recovery, either directly from (commercial?) farmers or indirectly from a levy at the (export?) slaughterhouses. If this were done, the responsibility for the execution of such activities could and probably should shift from entirely that of the government to either a PPP-based model or fully to the private sector (including farmer organizations).

- It seems that only retired people and the rural poor will engage in livestock farming if it is not made more attractive as a business. This challenge could be addressed by a Meat Council of Botswana (or a Botswana Meat Association). This body must promote livestock farming as a career and promote the overall livestock industry to attract skilled and enthusiastic people,

without which innovation and change will not be possible. Tertiary education emphasizing skill development will be required. Internships for young prospective beef farmers on established ranches would go a long way to developing the skills and attitudes needed to further commercialize and improve the production and productivity of the Botswana livestock value chain.

- Promoting an intensification of production, through intensified management of the range, the animals and the preparation for the market, will create rural employment. Management level will have to increase markedly in order to increase productivity levels. There is anecdotal evidence that productivity increases sharply in a short time when cattle-owning civil servants retire and start dedicating more time and money towards their livestock enterprise.

14.7.1 Restructuring of the beef subsector and the BMC

Given the increasingly competitive global beef market, and with GoB resources under pressure, the BMC must become more competitive. It is difficult to see how this could be achieved without the government reducing its role in the livestock sector and the private sector taking on a bigger role. A Meat Council of Botswana, as discussed in Section 14.4, could be a suitable instrument to facilitate the transfer of certain responsibilities from the public sector to the private sector. A gradual, or at least carefully prepared, shift from public to private management is recommended, given that liberalization policies can have a negative impact on producer prices and product quality in the initial stages (Folds and Ponte 2008). Changing the BMC's status essentially implies fundamental change in the beef value chain as a whole. Various strategic options, some of which complement each other, can be considered in this context:

- Give the BMC monopoly one last chance to prove itself. No matter what changes are made to the Act or the ownership structure of the BMC, it must rebuild and improve its position on the EU market and gain access to other markets in order to survive. Given the nature of the problem, this will require close collaboration with the DVS. With EU market access recently regained (August 2012), the BMC should be given a fixed period of time, perhaps three years, to achieve quantitative goals. If, at the end of that period, it had not achieved those goals, the monopoly and the heavy public sector expenditures to meet global standards may have to be abandoned.

- Offer the BMC's facilities and export rights to private-sector players as a for-fee service. This combines the strengths of the BMC (licensed EU abattoir [assuming this status is regained] and large capacity) and the private-sector firms (ability to develop higher value-added branded products) into an overall more competitive structure.

- Increase competitive pressure on the BMC by opening up the export markets to private-sector firms. This can be done by awarding export licences, perhaps gradually on an increasing quota basis, or by revising the BMC Act (removing the monopoly component). This strategy may backfire if the BMC, because of its legal status and MoA-controlled board structure (and MoA veto power), is held to requirements that do not apply to other players in the private sector (such as making particular investments or entering particular markets based on a socio-political rather than a business rationale). In this case, the BMC would likely not be able to compete with private-sector firms, possibly leading to a new monopolistic or oligopolistic structure in which farmers, especially smallholders, face even less attractive market opportunities. Another, perhaps smaller, risk is that the industry becomes so fragmented that no individual firm has the capacity (economies of scale) to meet EU market requirements and be competitive. The core point here is that increased competition is needed for a healthy beef exporting industry, but that the process should simultaneously involve a strengthening of the structure of the BMC and a persistent but gradual increase in competitive pressure.

- In line with the previous point, reduce the BMC's cost structure and improve its effectiveness by reducing the number of cattle slaughterhouses from three to two, thus removing a significant

amount of underutilized overhead cost. The Lobatse abattoir could remain the main export slaughterhouse, while either Maun in the red zone or Francistown in the green zone would be closed or mothballed. Alternatively, these abattoirs could be sold; however, without access to export markets, private investors may be reluctant to make such a significant investment. If Maun is to remain open, it may be necessary to remove the government-stipulated link between red-zone and green-zone cattle prices. It is difficult to justify continued political decision-making on business activities and cross-subsidization in today's more constrained financial environment. If, instead, the Maun slaughterhouse were to be sold off or leased out to a firm it could determine its own pricing policy and preferably develop its own export markets for red-zone beef; these would largely be within sub-Saharan Africa, where the FMD requirements are less stringent than those of the EU.

- Privatize the BMC, possibly in a gradual process whereby its various service subsidiaries (insurance, transport, storage) are privatized first. This would allow a shift to often more sharply priced open-market services and will allow the BMC to focus on its core competencies (processing and marketing beef). Privatization could also be done by breaking up the BMC's structure and privatizing the various operations (tannery,[173] Maun, Francistown and Lobatse abattoirs) as individual firms.

- Transfer BMC ownership to cattle farmers.[174] One way of preserving the BMC's role as a company working first and foremost for farmers while at the same time privatizing it would be to transfer ownership to the farmers (or farmer cooperatives) directly, with professional management being hired on performance-based contracts and farmers being represented in the board along with experienced business leaders, bankers and the government. This way, the BMC would have a clear profit objective, while farmers benefit directly as shareholders. One option for ownership transfer would be to pay farmers for their cattle in part in BMC shares.

- Build in checks and balances in the structure described in the previous point, in order to assure that farmers of all scales of operation benefit fairly. This would likely include: (1) a transparent, sufficiently detailed and third-party audited performance reporting structure that is directly accessible by all farmers; (2) farmer syndicates, associations or cooperatives to be set up based on locality and/or size of operation and organized into a limited set of apex structures fitting under the National Cattle Producers Association established in 2011; these bodies would elect representatives to the board of the BMC; and (3) a profit-sharing scheme that is representative (e.g. proportional to the number of cattle supplied to the BMC, accounting for quality). The establishment/strengthening of such a network of farmer organizations could also improve collaboration among farmers, strengthen their advocacy capacity, increase their market power in non-BMC channels and generally allow for more efficient and effective interaction with input and output markets, as well with as government support programmes. This structure of farmer representative bodies could also be used to ensure that farmers of all scales of operation have a good representation on a possible Meat Council of Botswana (Botswana Meat Association), along with the other value-chain stakeholders and the government. Botswana's beef value chain needs stronger institutions.

[173] The decommissioned tannery is currently used as a hide salting depot (BMC 2011).

[174] In Namibia farmers were offered a shareholding in abattoirs under the Marketing Incentive Scheme.

PART V Conclusions

After a long period of relatively undisturbed suboptimal performance largely focused on exporting into a tolerant market (considering quality and safety guarantees), the Botswana beef value chain has recently been hit by some shocks. First and foremost of these is the failure of the bolus-based traceability system that has undermined Botswana's beef exporting capacity. Addressing this situation, probably through the creation of a new system of official controls implemented by a new independent entity, should be considered a first priority. Second, outbreaks of FMD have placed heavy burdens on government resources to control and contain them; on the industry as a result of the loss of the most lucrative export market (EU); on feedlot operators because they could not sell their animals at the premium prices required to cover their expenses; and most importantly on the many producers who were left in uncertainty about whether they would be able to find a market for their animals. Third, there is a continuous problem of inefficient processing and underperforming marketing in Botswana's beef export channel, which negatively affects the cost and sale price of exported beef and results in low levels of competitiveness and profitability on international markets.

Given these conditions, it is vital for the beef subsector in Botswana to step back and consider its options. For any improved future envisioned, fundamental change is needed on both the supply and the marketing side. On the supply side, measures to be taken to increase the profitability of beef production and maintain or increase competitiveness in an increasingly liberalized world market should focus on stabilizing the number of animals in the national herd over the years (drought mitigation measures), increasing productivity (higher calving and offtake rates), increasing overall production (compound effect of the previous two measures plus improved management, especially feeding) and lowering overhead costs in slaughter and processing through industry consolidation and rationalization, currently difficult because of the BMC's legal monopoly on exports.

On the marketing side, the industry must develop additional export markets in order to reduce its heavy dependency on the EU market. The African, Russian and Middle Eastern markets appear to offer the best opportunities for exports of a wider range of products. At the same time, there are increasing opportunities in the domestic market. Domestic demand for beef is growing and processors and butchers are paying ever-increasing prices for beef.

This study took a detailed look at the underlying costs and returns to beef production at the farm, feedlot and butchery stages of the value chain and at how profits are shared between sector participants. Bearing in mind that the results would benefit from a careful review by local experts to validate the findings and should be interpreted as an indicative picture of value-chain costs and returns only, some of the key findings of the analysis are as follows:

- Cattle production is generally profitable in gross terms, but operates at a net loss when long-term capital-recovery costs are taken into account.
- There are few incentives for farmers to adopt improved management practices.
- Large herds provide better rates of return and generate more profit per head sold than do small herds.
- The high cost of fencing is a big challenge to meeting new EU market access requirements.
- Feedlot production can be profitable but is highly sensitive to the cost of imported feed and is risky because of the potential for bans on feed imports.
- All else being equal, commission-based feedlot production is far more profitable than independent feedlotting given current price structures.

- While a small butchery can be profitable, thin rates of return related to the high cost of abattoir beef can be an incentive to take short cuts with illegal slaughter.

The choice of maintaining the BMC's export monopoly or not is closely linked with the vision for the company's legal nature. If it continues as a statutory body, there is no reason to maintain the monopoly, which may well be against WTO rules, considering the level of direct and indirect public support this body has received. If the BMC were owned by a conglomerate of farmer-owned cooperatives, there may be stronger justification for maintaining such an export monopoly, as the accrued benefits from this monopoly would be ploughed back into helping members of the cooperatives to optimize their livestock production systems. Alternatively, opening up the beef export channel to the private sector, with perhaps a farmer-owned and privatized BMC in place, would likely create the right environment for increasing the competitiveness of Botswana's beef on various export markets.

Finally, this study found that there are critical data gaps in the knowledge that is needed to make well-informed decisions on the beef industry in Botswana. The most notable of these gaps are as follows:

- There are no detailed impact studies for the various government programmes. Studies needed include a quantitative and qualitative comparative analysis on which market/disease management strategies are the most beneficial.

- There are no detailed economic studies on the commercial viability of various business models, including the more holistic management models that may prove to be critical for Botswana's competitiveness (this study took a first step in this direction).

- There is no systematic gathering of marketing intelligence, e.g. on Botswana's competitive position in various markets (benchmark studies).

- There are gaps in the basic data on the value chain, such as herd size, numbers of stakeholders by type, throughput numbers at various levels in the value chain and so on. Although this study made a first attempt to gather some such data, addressing these data gaps in detail is beyond its scope. Targeting more markets, all of which will likely become more demanding, makes tracking markets and their specific standards even more complicated. It is therefore highly recommended that this type of data collection and analysis be incorporated in the research that is planned to be undertaken in the near future.

Annex 1 – Issues covered in this study

1. General overview of meat production, meat markets and meat processing

- Overview of production and marketing of meat processed products in Botswana, including trends and dynamics of meat production by type and category of farm enterprise
- Analysis of current meat production situation; domestic markets; exports and imports; cost structure (purchase price, sales price, wholesale and retail prices by meat grade); overall meat supply balance
- Profit and loss account of meat production by type of production
- Review of existing regulatory framework, including aspects of food-safety environment, animal identification and traceability
- Directions and effectiveness of measures of government support.

2. Production structure

- Dynamics of livestock population by type of farm enterprise for the last five years
- Farm organizational structures of livestock production: production enterprises and overview of their current situation by region (number of enterprises, organization, production level, equipment status, services, etc.); profit and loss account of production enterprises and financial/risk analysis of main production models
- Technology status in livestock production
- Current productivity parameters of livestock
- Cattle breeding situation (performance monitoring systems; progeny testing; role of private sector/producers' association roles).

3. Feed-base assessment

- Rangelands/pastures
- Fodder/forage
- Feed/concentrates (including quality control and regulation systems in place for processed feed; import/export of processed feed and associated quality/customs and tariffs).

4. Animal health and veterinary organization

- Review of public and private veterinary services (constraints/opportunities for private sector)
- Evaluation of epizootic situation on various diseases registered in the country
- Transboundary diseases situation and risks
- Effectiveness of anti-epizootic measures

- Capacity of medical products industry and provision of anti-epizootic measures and veterinary preparation, diagnostic preparations and disinfectants of domestic manufacture; constraints to import of animal health products

- Safety level of food and raw materials of animal origin at all stages of lifecycle and current level of food-safety guarantee measures.

5. Analysis of meat processing and the consumer goods industry

- Existing processing enterprises and overview of their current situation by region (number of enterprises, workload, equipment status etc.)

- Dynamics of meat processing by type in country regions

- Volume of meat consumption (by type of meat) in country regions, by season, in rural and urban areas and by ethnic group

- Dynamics of import/export by type of meat product in country regions

- Analysis of meat prices over the year (by region); analysis of factors influencing changes in prices

- Identification of existing barriers (tax, customs, administrative etc.) and shortcomings in development of the consumer-goods industry

- Determination of main factors influencing competitiveness; breakdown of costs and analysis of product quality; profit and loss account of meat-processing enterprises

- Determination of the main trends in sector development

- Recommendations and justification of the choice of meat-processing enterprises

- Analysis of distribution channels on internal and external markets; recommended industrial map (by region).

6. Market analysis

- International experience in meat production and processing; global trends; main factors affecting competitiveness (volume of world meat production and processing, determination of leading meat-producing and processing countries); main trends in import and consumption of meat in the leading countries; determination of the main factors influencing competitiveness of meat production and processing

- Potential markets and niche markets for meat and meat products: countries – main producers and exporters of meat and meat products (volume of export), countries – main importers of meat and meat products (volume of import); forecast of the level of consumption and import in countries that are considered to be potential importers of meat and meat products in 2010–2015 using various scenarios; forecast of wholesale prices in potential importing countries 2010–2015 using scenarios; analysis of meat production and processing sectors in exporting countries; analysis of meat production and processing sectors in potential importing countries; analysis of current export price for meat and meat products

- Analysis of prevailing domestic quality and safety standards for meat and meat products and the capacity of national producers and processors to comply with such standards; comparison

with European standards; estimation of procedural and technological requirements for compliance with internationally acknowledged quality and safety standards.

7. Value-chain development options (policy, strategy, implementation)

- Analysis of the subsector's strengths, weaknesses, opportunities and threats (SWOT)
- Recommendations for improvement of regulatory framework, tariff settings and national standards for meat and meat products
- Required policy support
- Development options for small-, medium- and large-scale livestock enterprises
- Options for development of organizational arrangements
- Recommendations for introduction of modern technologies and upgrading of machinery and equipment
- Options for development of a domestic breeding programme.
- Recommendations for the establishment of a sustainable feed base based on improved pasture management, preservation and quality systems; options for a compound feed industry
- Recommendation of animal-health and food-safety measures: compliance with OIE standards; veterinary sanitary and disease prevention measures, diagnosis and treatment of key diseases, with identification of veterinary preparations, disinfectants and diagnostic preparations required; development of unified system of livestock identification, and establishment of veterinary inspection units and veterinary subsidiaries in local authorities; options for the abattoir system and network (with infrastructure for meat cutting, hanging, storing, transportation and marketing); options for a domestic medical industry
- Options for development of the processing industry: viability of meat processing enterprises; simulation of an investment (i.e. private investment and government investment) within years
- Options for development of the value chain along the intermediary sections from production to processing and marketing
- Identification of scientific, human resource and information support requirements.

Annex 2 – Additional end-market information

Table 36: Selected data on the top 25 global exporters of frozen beef, 2010[175]

Rank by export value	Exporter	Value exported in 2010 (US$ '000)	Trade balance in 2010 (US$ '000)	Quantity exported in 2010 (t)	Unit value (US$/t)	Annual growth in value 2006–2010 (%)	Annual growth in quantity 2006–2010 (%)	Annual growth in value 2009–2010 (%)	Share in world exports (%)
	World	**14,555,464**	**871,234**	**3,944,004**	**3,691**	**10**	**–2**	**26**	**100**
1	Brazil	3,376,278	3,311,451	870,559	3,878	6	–7	27	23.2
2	Australia	2,263,221	2,254,045	697,508	3,245	2	0	21	15.5
3	India	1,676,479	1,676,479	490,842	3,416	23	0	72	11.5
4	USA	1,520,808	161,867	346,108	4,394	59	57	74	10.4
5	New Zealand	1,176,684	1,170,738	339,667	3,464	3	0	20	8.1
6	Uruguay	860,111	860,021	210,144	4,093	8	–3	16	5.9
7	Argentina	417,866	417,410	92,427	4,521	1	–13	–49	2.9
8	Paraguay	379,963	379,963	113,150	3,358	11	–1	38	2.6
9	Germany	264,928	48,169	68,877	3,846	11	6	19	1.8
10	Nicaragua	234,910	234,617	65,912	3,564	42	30	65	1.6
11	Italy	231,934	– 31,792	57,830	4,011	7	3	24	1.6
12	Netherlands	213,098	12,446	40,516	5,260	–1	0	–9	1.5
13	Canada	195,628	28,665	51,068	3,831	21	13	54	1.3
14	Belarus	195,103		55,673	3,504	9	3	0	1.3
15	UAE	175,446	41,694	43,379	4,044			81	1.2
16	Poland	148,892	130,321	42,862	3,474	34	26	62	1
17	Ireland	134,459	90,066	48,241	2,787	–9	–6	27	0.9
18	Spain	94,499	–34,848	25,455	3,712	7	2	31	0.6
19	Hong Kong, China	82,526	–374,838	35,139	2,349	76	68	–19	0.6
20	Belgium	82,126	20,839	20,492	4,008	13	11	15	0.6
21	France	79,394	– 181,836	20,708	3,834	2	–3	1	0.5
22	China	75,658	–1,780	15,029	5,034	17	–8	94	0.5
23	Mexico	73,696	49,671	33,721	2,185	11	26	37	0.5
24	Austria	64,519	41,549	18,531	3,482	20	16	29	0.4
25	**Botswana**	**60,616**	**60,556**	**17,791**	**3,407**	**9**	**6**	**23**	**0.4**

Source: International Trade Centre Trade Map.

[175] Data reflect trade for products classified under Harmonized System code 0202 Meat of bovine animals, frozen.

Table 37: Selected data on the top 25 global exporters of fresh/chilled beef, 2010[176]

Rank by export value	Exporter	Value exported in 2010 (US$ '000)	Trade balance in 2010 (US$ '000)	Quantity in 2010 (t)	Unit value (US$/t)	Annual growth in value 2006–2010 (%)	Annual growth in quantity 2006–2010 (%)	Annual growth in value 2009–2010 (%)	Share in world exports (%)
	World	**18,051,465**	**805,191**	**3,498,611**	**5,160**	**5**	**3**	**4**	**100**
1	Netherlands	2,172,798	954,699	342,661	6,341	3	5	−9	12
2	USA	1,876,306	530,297	380,650	4,929	10	6	17	10.4
3	Germany	1,670,462	176,929	334,348	4,996	3	2	−4	9.3
4	Australia	1,661,839	1,656,591	271,085	6,130	−2	−3	10	9.2
5	Ireland	1,598,648	1,503,946	271,210	5,895	1	−1	−2	8.9
6	France	1,231,472	−96,585	236,143	5,215	4	3	−3	6.8
7	Canada	1,078,296	522,918	320,103	3,369	0	1	23	6
8	Poland	834,177	801,400	232,927	3,581	18	15	19	4.6
9	Belgium	637,209	421,576	103,504	6,156	4	1	3	3.5
10	Argentina	631,149	626,884	62,352	10,122	1	−8	−11	3.5
11	Paraguay	500,090	500,090	97,880	5,109	38	22	80	2.8
12	Brazil	484,783	388,881	80,696	6,008	−13	−13	32	2.7
13	UK	451,293	−505,292	95,093	4,746	30	24	24	2.5
14	Austria	409,904	236,300	86,343	4,747	10	7	−5	2.3
15	Denmark	382,690	− 160,350	73,407	5,213	10	13	1	2.1
16	Italy	375,386	−2,123,917	75,850	4,949	7	4	22	2.1
17	Spain	373,746	− 248,256	89,791	4,162	0	−3	−5	2.1
18	Uruguay	273,566	273,566	35,917	7,617	0	−11	28	1.5
19	Belarus	270,474	270,268	69,764	3,877	97	85	54	1.5
20	Mexico	214,450	−636,264	38,363	5,590	22	26	80	1.2
21	New Zealand	198,086	186,002	27,272	7,263	4	−1	32	1.1
22	**Botswana**	**97,757**	**97,615**	**18,521**	**5,278**	**19**	**14**	**52**	**0.5**
23	Lithuania	88,213	84,773	23,051	3,827	7	−1	2	0.5
24	Nicaragua	72,759	72,697	18,221	3,993	23	20	−18	0.4
25	Pakistan	63,361	62,618	24,523	2,584	65	56	40	0.4

Source: International Trade Centre Trade Map.

[176] Data reflect trade for products classified under Harmonized System code 0201 Meat of bovine animals, fresh or chilled. This includes caracasses, cuts bone-in and cuts boneless.

Table 38: Selected data on the top 25 global net exporters of fresh/chilled beef, 2010[177]

Rank by trade balance	Exporter	Value exported in 2010 (US$ '000)	Trade balance in 2010 (US$ '000)	Quantity exported in 2010 (t)	Unit value (US$/t)	Annual growth in value 2006–2010 (%)	Annual growth in quantity 2006–2010 (%)	Annual growth in value 2009–2010 (%)	Share in world exports (%)
1	Australia	1,661,839	1,656,591	271,085	6,130	−2	−3	10	9.2
2	Ireland	1,598,648	1,503,946	271,210	5,895	1	−1	−2	8.9
3	Netherlands	2,172,798	954,699	342,661	6,341	3	5	−9	12
4	Poland	834,177	801,400	232,927	3,581	18	15	19	4.6
5	Argentina	631,149	626,884	62,352	10,122	1	−8	−11	3.5
6	USA	1,876,306	530,297	380,650	4,929	10	6	17	10.4
7	Canada	1,078,296	522,918	320,103	3,369	0	1	23	6
8	Paraguay	500,090	500,090	97,880	5,109	38	22	80	2.8
9	Belgium	637,209	421,576	103,504	6,156	4	1	3	3.5
10	Brazil	484,783	388,881	80,696	6,008	−13	−13	32	2.7
11	Uruguay	273,566	273,566	35,917	7,617	0	−11	28	1.5
12	Belarus	270,474	270,268	69,764	3,877	97	85	54	1.5
13	Austria	409,904	236,300	86,343	4,747	10	7	−5	2.3
14	New Zealand	198,086	186,002	27,272	7,263	4	−1	32	1.1
15	Germany	1,670,462	176,929	334,348	4,996	3	2	−4	9.3
16	**Botswana**	**97,757**	**97,615**	**18,521**	**5,278**	**19**	**14**	**52**	**0.5**
17	Lithuania	88,213	84,773	23,051	3,827	7	−1	2	0.5
18	Nicaragua	72,759	72,697	18,221	3,993	23	20	−18	0.4
19	Pakistan	63,361	62,618	24,523	2,584	65	56	40	0.4
20	Namibia	53,887	53,640	7,929	6,796	11	13	33	0.3
21	China	33,428	26,644	7,118	4,696	−3	−16	50	0.2
22	India	20,023	20,023	3,084	6,493	0	−30	75	0.1
23	Hungary	48,819	18,919	14,950	3,265	18	17	9	0.3
24	Latvia	20,441	17,075	7,621	2,682	27	26	23	0.1
25	Serbia	16,346	16,346	3,478	4,700	−18	−24	−16	0.1
	World	**18,051,465**	**9,562,032**[178]	**3,498,611**	**5,160**	**5**	**3**	**4**	**100**

Source: International Trade Centre Trade Map.

[177] Product classification 0201 Meat of bovine animals, fresh or chilled.

[178] This number reflects the total net exported value for all countries with a positive net export.

Table 39: Selected data on the top 25 global net exporters of frozen beef, 2010[179]

Rank by trade balance	Exporters	Value exported in 2010 (US$ '000)	Trade balance in 2010 (US$ '000)	Quantity exported in 2010 (t)	Unit value (US$/t)	Annual growth in value 2006–2010 (%)	Annual growth in quantity 2006–2010 (%)	Annual growth in value 2009–2010 (%)	Share in world exports (%)
1	Brazil	3,376,278	3,311,451	870,559	3,878	6.0	−7.0	27.0	23.2
2	Australia	2,263,221	2,254,045	697,508	3,245	2.0	–	21.0	15.5
3	India	1,676,479	1,676,479	490,842	3,416	23.0	–	72.0	11.5
4	New Zealand	1,176,684	1,170,738	339,667	3,464	3.0	–	20.0	
5	Uruguay	860,111	860,021	210,144	4,093	8.0	−3.0	16.0	5.9
6	Argentina	417,866	417,410	92,427	4,521	1.0	−13.0	−49.0	2.9
7	Paraguay	379,963	379,963	113,150	3,358	11.0	−1.0	38.0	2.6
8	Nicaragua	234,910	234,617	65,912	3,564	42.0	30.0	65.0	1.6
9	Belarus	195,103	193,617	55,673	3,504	9.0	3.0	–	1.3
10	USA	1,520,808	161,867	346,108	4,394	59.0	57.0	74.0	10.4
11	Poland	148,892	130,321	42,862	3,474	34.0	26.0	62.0	1.0
12	Ireland	134,459	90,066	48,241	2,787	−9.0	−6.0	27.0	0.9
13	**Botswana**	**60,616**	**60,556**	**17,791**	**3,407**	**9.0**	**6.0**	**23.0**	**0.4**
14	Mexico	73,696	49,671	33,721	2,185	11.0	26.0	37.0	0.5
15	Germany	264,928	48,169	68,877	3,846	11.0	6.0	19.0	1.8
16	UAE	175,446	41,694	43,379	4,044			81.0	1.2
17	Austria	64,519	41,549	18,531	3,482	20.0	16.0	29.0	0.4
18	Ukraine	45,031	37,886	13,187	3,415	5.0	− 4.0	−24.0	0.3
19	Canada	195,628	28,665	51,068	3,831	21.0	13.0	54.0	1.3
20	Belgium	82,126	20,839	20,492	4,008	13.0	11.0	15.0	0.6
21	Costa Rica	25,823	18,427	8,880	2,908	12.0	10.0	39.0	0.2
22	Namibia	18,361	16,286	3,922	4,682	23.0	37.0	13.0	0.1
23	Netherlands	213,098	12,446	40,516	5,260	−1.0	–	−9.0	1.5
24	Panama	14,726	11,318	4,423	3,329	58.0	51.0	47.0	0.1
25	Lithuania	13,180	9,907	3,565	3,697	17.0	17.0	23.0	0.1
	World	**14,555,464**	**11,314,201**[180]	**3,944,004**	**3,691**	**10.0**	**−2.0**	**26.0**	**100.0**

Source: International Trade Centre Trade Map.

[179] Product classification 0202 Meat of bovine animals, frozen.

[180] This number reflects the total net exported value for all countries with a positive net export.

Table 40: Selected data on the top 25 global exporters of fresh boneless cuts, 2010[181]

Rank by quantity exported	Exporters	Value exported in 2010 (US$ '000)	Trade balance in 2010 (US$ '000)	Quantity exported in 2010 (t)	Unit value (US$/t)	Annual growth in value 2006–2010 (%)	Annual growth in quantity 2006–2010 (%)	Share in world exports (%)
	World	**11,554,702**		**1,995,887**	**5,789**	**4.0**	**2.0**	**100.0**
1	USA	1,725,603	598,985	358,159	4,818	9.0	5.0	14.9
2	Canada	946,206	485,470	287,728	3,289	–	1.0	8.2
3	Australia	1,618,151	1,612,973	263,109	6,150	−2.0	−3.0	14.0
4	Ireland	1,325,308	1,270,480	211,685	6,261	2.0	–	11.5
5	Netherlands	1,236,004	723,491	169,779	7,280	4.0	5.0	10.7
6	Paraguay	499,598	499,598	97,682	5,115	38.0	22.0	4.3
7	Germany	612,490	−403,039	86,095	7,114	2.0	–	5.3
8	Brazil	484,743	396,635	80,683	6,008	−13.0	−13.0	4.2
9	Argentina	631,139	631,061	62,351	10,122	1.0	−8.0	5.5
10	UK	281,426	−465,820	43,346	6,493	38.0	38.0	2.4
11	Poland	168,222	146,429	33,961	4,953	25.0	23.0	1.5
12	Belgium	247,807	100,049	33,925	7,305	10.0	6.0	2.1
13	Uruguay	260,546	260,546	30,946	8,419	–	−11.0	2.3
14	Austria	156,045	63,918	27,676	5,638	42.0	42.0	1.4
15	New Zealand	192,724	181,230	26,460	7,284	4.0	−1.0	1.7
16	France	187,051	−562,348	26,056	7,179	–	−1.0	1.6
17	Denmark	191,454	−201,188	25,243	7,584	6.0	7.0	1.7
18	Italy	185,496	−438,306	19,669	9,431	5.0	1.0	1.6
19	Mexico	117,393	−714,833	18,943	6,197	24.0	26.0	1.0
20	Nicaragua	69,655	69,593	16,959	4,107	22.0	19.0	0.6
21	**Botswana**	**92,572**	**92,555**	**16,626**	**5,568**	**18.0**	**11.0**	**0.8**
22	Lithuania	55,768	54,583	12,947	4,307	9.0	1.0	0.5
23	Namibia	53,849	53,730	7,918	6,801	11.0	13.0	0.5
24	China	33,428	27,153	7,118	4,696	−3.0	−16.0	0.3
25	Spain	35,113	−329,858	6,987	5,025	2.0	−3.0	0.3

Source: International Trade Centre Trade Map.

[181] Product classification 020130 Bovine cuts boneless, fresh or chilled

Table 41: Selected data on the top 25 global exporters of frozen boneless cuts, 2010[182]

Rank by export value	Exporters	Value exported in 2010 (US$ '000)	Trade balance in 2010 (US$ '000)	Quantity exported in 2010 (t)	Unit value (US$/t)	Annual growth in value 2006–2010 (%)	Annual growth in quantity 2006–2010 (%)	Share in world exports (%)
	World	**13,518,430**		**3,647,416**	**3,706**	**10.0**	**–**	**100.0**
1	Brazil	3,368,560	3,306,786	866,976	3,885	6.0	−8.0	24.9
2	Australia	2,134,131	2,125,635	648,734	3,290	3.0	–	15.8
3	India	1,675,583	1,675,583	490,548	3,416	24.0	1.0	12.4
4	New Zealand	1,105,222	1,099,375	308,767	3,579	4.0	−1.0	8.2
5	USA	1,146,313	−199,155	271,592	4,221	53.0	50.0	8.5
6	Uruguay	853,220	853,130	207,144	4,119	8.0	−3.0	6.3
7	Paraguay	375,432	375,432	111,200	3,376	11.0	−2.0	2.8
8	Argentina	409,860	409,404	89,829	4,563	2.0	−12.0	3.0
9	Germany	251,757	41,211	65,950	3,817	11.0	7.0	1.9
10	Nicaragua	229,751	229,469	63,241	3,633	43.0	31.0	1.7
11	Italy	226,730	−23,738	54,866	4,132	7.0	2.0	1.7
12	Ireland	130,091	96,988	45,591	2,853	−9.0	−7.0	1.0
13	UAE	173,004	46,337	42,812	4,041	–	–	1.3
14	Canada	134,352	−25,143	37,606	3,573	23.0	14.0	1.0
15	Poland	123,373	106,953	35,953	3,432	32.0	24.0	0.9
16	Hong Kong, China	75,353	−330,175	32,460	2,321	84.0	85.0	0.6
17	Mexico	68,630	47,513	31,939	2,149	16.0	33.0	0.5
18	Netherlands	198,385	14,061	31,790	6,240	2.0	4.0	1.5
19	Spain	90,119	−17,086	23,931	3,766	7.0	2.0	0.7
20	Belgium	80,398	22,589	19,464	4,131	13.0	11.0	0.6
21	France	74,718	−180,297	19,356	3,860	3.0	−3.0	0.6
22	Austria	62,667	41,878	18,196	3,444	21.0	16.0	0.5
23	**Botswana**	**60,528**	**60,509**	**17,740**	**3,412**	**9.0**	**6.0**	**0.4**
24	China	75,650	3,326	15,029	5,034	17.0	−8.0	0.6
25	Jordan	38,198	−24,511	13,671	2,794	90.0	53.0	0.3

Source: International Trade Centre Trade Map.

[182] Product classification 020230 Bovine cuts boneless, frozen

Notes on the different import regimes in the EU market

(Interim) Economic Partnership Agreement (I)EPA system: Botswana, Lesotho, Namibia, Swaziland and other countries currently fall under this system. The IEPA system provides for quota- and tariff-free import of deboned beef. Botswana, Namibia and Swaziland were the only SADC countries with licences to export beef to the EU, but Swaziland has given up exporting beef to the EU.

HQB import-levy-free quota ("Grain-fed beef") for non-ACP countries: Council Regulation 617/2009 opened an autonomous tariff quota for high-quality beef (HQB) and Commission Regulation 620/2009 provides for the administration of the HQB quota. This quota, nicknamed the "Hilton quota", is open to Argentina, Brazil, Uruguay, Paraguay, USA, Canada, Australia and New Zealand and is for high-quality deboned chilled or frozen beef. These countries can thus now export beef to the EU under the same conditions as Botswana and Namibia, with the only difference that there is a quota. The EU requirements for this category are as follows:

1. Beef cuts must be from carcasses of heifers and steers less than 30 months of age that have been fed for at least the last 100 days before slaughter on a diet containing not less than 62 percent concentrates and/or feed grain co-products on a dietary dry-matter basis and that has a metabolizable energy content of not less than 12.26 MJ/kg dry matter.

2. The heifers and steers that are fed the diet described in point 1 shall be fed, on average, no less than 1.4 percent of live body weight per day on a dry-matter basis.

3. The carcasses from which the beef cuts are derived are evaluated by an evaluator employed by the national government who bases the evaluation, and a resulting classification of the carcass, on a method approved by the national government. The national government evaluation method, and its classifications, must evaluate expected carcass quality using a combination of carcass maturity and palatability traits of the beef cuts. Such an evaluation method of the carcass shall include, but not be limited to, an evaluation of the maturity characteristics of colour and texture of the longissimus dorsi muscle and bone and cartilage ossification, as well as an evaluation of expected palatability traits, including a combination of the discrete specifications of intramuscular fat and firmness of the longissimus dorsi muscle.

4. The cuts shall be labelled in accordance with Article 13 of Regulation (EC) No 1760/2000 of the European Parliament and of the Council.

5. The indication "High Quality Beef" may be added to the information on the label.

Tariff HQB quota ("Grass-fed beef"): This is bound by quota per country, EU inspections and certification, and is subject to a 20 percent import duty. The total quota under this system is 62,500 tonnes. With Japan imposing a 38.5 percent import quota, this market is interesting for Australia and New Zealand. South American producers are, however, nearer to the European market and have lower transport costs.

GATT frozen beef and veal quota:[183] Beef products entering under this quota (53,000 tonnes) incur a 20 percent *ad valorem* customs duty, but no specific import duty. The quota is operated annually and the main difference between this quota and the HQB quota is that only for frozen boneless product. Also, the quota is distributed among member-state importers/operators, with provision to accommodate new entrants.

[183] Information for the following types of imports from http://www.mla.com.au/Prices-and-markets/Overseas-markets/Europe/Beef

Two subquotas also operate. The first is allocated to traditional importers of GATT, the second to operators approved in advance and who have lodged half-yearly applications with performance bonds, which are refunded when customs documents are tendered following an import.

Import tariff quota for frozen beef for processing: This annual quota covers the manufacturing sector and is often referred to as the "System A/B" or manufacturing beef quota. It totals 63,703 tonnes of either frozen bone-in forequarters or frozen boneless cuts, thick or thin skirt. It can be used in two types of processed products – 50,000 tonnes for A products and 13,703 tonnes for B products. The scheme operates on an application system with a 20 percent duty rate for System A and a 20 percent plus reduced base-specific duty for System B. An application security fee of €6/100 kg and licence security fee of €12/100 kg are also applicable.

Frozen thin skirt quota: A quota of 1,500 tonnes of frozen thin skirt may be imported free of specific import customs duty, but a 4 percent *ad valorem* customs duty applies. Of the 1,500 tonnes, 700 tonnes are reserved for Argentina and 800 tonnes for other non-EU countries.

Outside the above regimes, importers pay the full import tariff. Table 42 gives an overview of the import tariff and other duties to be paid when importing meat and offal outwith the quotas.

Table 42: Regular duties for EU beef imports

Category	Import duty (% of CIF value)	Specific import customs duty (Euro/tonne)
Meat of bovine animals – fresh or chilled		
Carcasses and half-carcasses	12.8	1,768
Bone-in "compensated" quarters	12.8	1,768
Bone-in forequarters	12.8	1,414
Bone-in hindquarters	12.8	2,122
Bone-in other	12.8	2,652
Boneless	12.8	3,034
Meat of bovine animals – frozen		
Carcasses and half-carcasses	12.8	1,768
Bone-in forequarters	12.8	1,414
Bone-in hindquarters	12.8	2,211
Bone-in other	12.8	2,653
Boneless forequarter cuts	12.8	2,211
Crop, chuck, blade and brisket cuts	12.8	2,211
Boneless other	12.8	3,041
Edible offal		
Bovine offal – fresh, chilled or frozen	Free	–
Thick or thin skirt – fresh or chilled	12.8	3,034
Thick or thin skirt – frozen	12.8	3,041
Meat and edible meat offal, brine-salted, dried, smoked		
Bone-in	15.4	
Boneless	15.4	
Other prepared or preserved meat or meat offal		
Uncooked, mixtures of cooked and uncooked	–	3,034
Cooked in airtight containers (incl. corned beef)	16.6	–

Annex 3 – VC mapping quantitative analysis details

Estimates of the dimension of the beef subsector in Botswana in 2010

There are few reliable statistics on the beef subsector for value-chain mapping purposes and therefore informed assumptions based on key informant feedback, the need for internal consistency and triangulation are the only alternative. The numbers below reflect this study's estimates using this approach. The purpose of these numbers therefore is not to achieve high accuracy, but rather to indicate an order of magnitude.

Variable	Estimates	Notes
Beef value chain at the national level	77,000 farmers Herd of 2.7 million head Offtake of 316,000 head (12%)	CSO (2012) herd estimate is 2.7 million. Offtake is set a bit higher than usually indicated because of the high response to the DCP programme in 2010 and assuming no change in upward trend in sale of animals into domestic market. Number of farmers from CSO (2012).
Ranch farmers	700 farmers Herd of 300,000 (10%) Average herd: 430 head Offtake of 54,000 head (18%) 33% to feedlot (18,000)	Number of farmers based on GoB (2007) and CSO (2012). Herd size (10 percent of the national herd) is based on key informant data and GoB (2007). Offtake rate is from CSO (2012), but assuming higher rates given high 2010 BMC deliveries. Percentage of the offtake going to the feedlot is an authors' estimate, based on key informant data. Average herd size is calculated.
Medium- to large-scale communal farmers (>150 cattle)	2,100 farmers Herd of 800,000 (30%) Average herd: 380 Offtake of 120,000 (15%) 30% to feedlot (33,000)	Number of farmers based on GoB (2007) and CSO (2102), with the cut-off between small and larger set at 150 by the authors. Herd size (30 percent of the national herd) is based on key informant data and GoB (2007). Offtake rate as above. Percentage of the offtake going to the feedlot is an authors' estimate based on BMC data and key informant data. Average herd size is calculated.
Small-scale communal farmers (<150 animals)	74,200 farmers Herd of 1.6 million (60%) Average herd: 22 head Offtake of 144,000 head (9%) 33% to feedlot (48,000)	Number of farmers based on GoB (2007) and CSO (2012), with the cut-off between small/large as above. Herd size is derived as above. Offtake rate as above. Percentage of the offtake going to the feedlot is an authors' estimate based on key informant and BMC data. Average herd size is calculated.
Size of feedlot operations	20 feedlot operations 100,000 head ⅓ of national offtake 20% from ranchers 30% from medium–large farms 50% from small farms	Number of feedlots provided by key informants. Number of animals based on 73,000 going into BMC contracted feedlots, plus existence of private feedlots, incl. one large feedlot of 20,000 head and feedlots operated by ranchers under BMC's feed advance scheme.
Size of beef exports	25,000 tonnes (boneless) 1 exporter BWP730 million in exports (US$110 million)	180,000 BMC head = 28,000 tonnes of beef with 223 kg CDM, 70 percent meat, with roughly 90 percent exported. Export value based on BMC data. (FX rate for 31/12/2010 – oanda.com). Hides, canned meat, by-products (blood meal, offal, carcass meal, tallow, gall stones) are excluded.

Variable	Estimates	Notes
Size of domestic beef market	26,000 tonnes (bone-in) of which 22,000 tonnes sold commercially BWP705 million in beef sales (US$107 million) 13 kg of beef per year/person	Domestic market is sum of BMC domestic sales (3,000 tonnes) plus meat from 111,000 head non-BMC (22,000 tonnes of bone-in beef based on 210 kg CDM, 80 percent meat yield – bone-in). Market value based on a retail price of BWP30/kg for 90 percent of the volume, and BWP50/kg for 10 percent sold as value added. Hides, canned meat and by-products are excluded. Excluded from commercial sales are the 25,000 head of cattle (4,000 tonnes bone-in) consumed by the cattle producers directly.[184]
Abattoirs	100 registered red meat abattoirs	List provided by the DVS. Four linked to modern processors, 15 municipal/private abattoirs, 81 private rural slaughter house or slab facilities.
Modern beef processors	3+	Senn Foods, Quality Meats, Van Riet. There are also several smaller processing facilities of butchery chains; these are under "Butchers".
Butchers	500, some part of chains BWP580 million in beef sales 18,500 tonnes of beef 80% of the market	Number based on key informant estimates. Sales in volume and value are derived from subtracting the supermarket share from the total domestic market sales.
Modern retail (supermarkets and cash-and-carry stores)	6 supermarket chains, 160 outlets, plus cash-and-carry chains BWP125 million in beef sales 3,500 tonnes of beef products 20% of domestic beef market	3.5 percent of Choppies BWP2.4 billion sales come from bakery, butchery and convenience foods (Mokgethi 2011). If we assume 1 percent of this goes to beef, then beef sales are BWP24 million (calculation confirmed by Choppies) and given that Choppies represents one-third of the modern grocery retail market, total beef sales through supermarkets is estimated at BWP75 million. In addition, based on detailed key informant data, we estimate that cash-and-carry operations sold BWP50 million in beef in 2010. Assuming a retail price of BWP40/kg (higher than for butcheries) and BWP30/kg for cash-and-carry stores, this represents around 3,500 tonnes of beef.
Agricultural GDP	BWP2.3 billion	2.3 percent of GDP (CSO 2011)
Cattle GDP	BWP1.3 billion 57% of agricultural GDP	100,000 feedlot animals at BWP5,300/head plus 216,000 oxen-system animals at BWP3,400/head (includes 25,000 head of non-marketed cattle – self-consumption).
Beef GDP	BWP1,650 million US$250 million 1.7% of GDP	Adding exports, domestic sales, and BWP200 million for hides (BWP35 million), canned (BWP65 million) and by-products (BWP100 million) – based on BMC sales, key informants and author estimates.

[184] Statistics indicate that about 25,000 animals are slaughtered informally, on traditional slabs or under the tree. That this figure is realistic, and likely even an underestimate, is shown by the following calculation. For every wedding or funeral in the country one or more animals are slaughtered. With a crude death rate of 9 per 1000 in 2010 and 5,000 official weddings in 2007, some 22,000 animals are likely slaughtered for ceremonies.

Annex 4 – Domestic cattle price data by region

Table 43 below shows average prices received by communal farmers by district and region. The table shows that there are some variations between districts and regions. For instance, in 2008 the highest average regional prices (BWP2,419) were paid in Francistown region, followed by Gaborone (BWP2,048) and the lowest prices were paid in Maun region (BWP1, 593) followed by the Southern region (BWP1,779). Prices are highest in areas surrounding the cities of Francistown and Gaborone, with Gaborone region receiving slightly lower prices than the Francistown region because most of its districts are located far from the city. Prices are lowest in the Maun region presumably because of the frequent outbreaks of FMD in that region. Cattle prices increased on average by 27 percent between 2007 and 2008. It must be borne in mind that the prices given in this table are not for mature animals only, whereas the BMC prices are for mature animals.

Table 43: Average cattle prices in BWP/head by district/region, Botswana, 2007–2008

Town/village or region	2007	2008	Town/village or region	2007	2008
Tonota	1712	2818	Kweneng West	1525	1846
Bamalete/Tlokweng	1536	2672	Ngwaketse South	1526	1823
Hukuntsi	1817	2475	**Central Region**	1597	1810
Francistown Region	1425	2419	**Southern Region**	1507	1779
Tutume	1334	2284	Barolong	1547	1758
Kweneng South	1562	2105	Letlhakane	1733	1749
Gaborone Region	1564	2048	Mahalapye West	1430	1724
Palapye	1615	2043	Mahalapye East	1529	1713
Ngwaketse Central	1453	1980	Gantsi	1479	1661
Kweneng North	1653	1967	Ngamiland East	1362	1637
Selebi-Phikwe	1497	1939	Tsabong	1462	1633
Serowe	1721	1926	**Maun Region**	1460	1593
Kgatleng	1570	1918	Ngwaketse West	1511	1557
Western Region	1528	1897	Bobonong	1454	1503
Tati	1417	1885	Ngamiland West	2044	1294
Ngwaketse North	1545	1869	Chobe	1179	1129
Average	1514	1924			

Annex 5 – Profit and loss analysis background

The financial analyses presented in sections 6.5, 7.3 and 11.2 present details of the underlying costs and returns to beef production at the farm, feedlot and butchery stages of the value chain and examine how profits are shared between sector participants. Despite the importance of beef to Botswana, the country does not yet have a routine system for monitoring the costs and profitability of beef production and it is hoped that the analytical methods and spreadsheet templates developed here will be adopted as part of the country's regular planning process.

These analyses are based on data collected during a seven-day visit to Botswana from 4 to 11 March 2012 that was facilitated by the Agricultural Hub. During the mission, meetings were held with a wide variety of beef-sector stakeholders, including independent and commission-based feedlot operators, the Botswana Meat Commission (BMC), private abattoir operators, butchers, processors, retailers and input supply companies in and around Gaborone and Lobatse and with five cattle-post farmers near Molapolole.

Exchange rate

Local currency	=	Botswana Pula (BWP)
US$1.00	=	BWP 7.00
BWP1.00	=	US$ 0.1429

Weights and measures

1 acre	=	0.404 hectare
1 hectare	=	2.471 acres
1 kilogram	=	2.204 pounds
1,000 kilograms	=	1 tonne
1 kilometre	=	0.62 miles

Approximate cattle ages and terminology

0 teeth	=	less than 24 months
2 teeth	=	24–36 months
4 teeth	=	37–48 months
6 teeth	=	49–60 months
8 teeth (full mouth)	=	more than 60 months

Weaner : newly weaned calf (about 12 months)

Heifer: young female of reproductive age (about 24 months, in-calf or empty)

Cow: female that has give birth one or more times

Steer: castrated male

The quantitative analysis was prepared using a set of Excel spreadsheet templates developed specially for this study (a soft-copy can be found on the attached CD-ROM). Great care was taken to ensure that the templates are as transparent and user-friendly as possible so that anyone with a detailed interest in the Botswana cattle sector can easily model other management and price conditions. The templates are an important output of this study and include several embedded comments to explain how the spreadsheets work and help other analysts put the tools to practical use.

Main assumptions

The following general assumptions and procedures were applied in our analyses. Further details of specific assumptions applied at the farm, feedlot and butchery stages of the value chain are given with the discussion of the main results for those activities and in the spreadsheet models.

Current prices

The analyses are based on prices observed during data collection. During the exercise, it was learned that the BMC had just reduced the live-weight prices paid to farmers by around 19 percent for certain classes of animals because of changes in regional export parity prices. The main analysis of farm-level profits was therefore prepared using the new (reduced) prices. To test the impact of the price reduction (and to demonstrate the flexibility of the spreadsheet templates), a quick sensitivity analysis was also prepared in which the old prices were inserted in the model.

Normal season

The analyses are based on a so-called normal season with adequate rainfall. Higher mortality rates, slower growth and other differences could be inserted in the templates to simulate drought conditions.

Labour

All financial models include a cost for hired labour as appropriate (herdsmen at the farm level, general workers and a supervisor at the feedlot level and sales staff /meat cutters at the butchery level). However, no cost was included for the owner's time or for other senior management. The estimates of gross and net profits can therefore be reinterpreted as returns to the owner's labour.

Dressing-out percentages

Conversion rates from live weight to cold dressed mass have an important bearing on value-chain profits for all participants. In Botswana, these were said to vary from 49 percent to 56 percent depending the animal's breed, grazing patterns, diet and general health, and whether feedlotting was performed. Details of the dressing-out percentages used for the farm-level analysis are shown in Table 20. For animals that have been through a feedlot, the assumed dressing-out percentage is 55 percent; for butchers that often use lower-quality animals, the assumed dressing-out percentage is 52 percent. Again, further spreadsheet variations could be prepared using different dressing-out percentages. This variable has an important bearing on the total value and profit from beef and would be a good area for further analysis to test the impact of policies aimed at improving dressing-out ratios.

Government subsidies

The Government of Botswana provides a range of subsidies to beef producers, including free vaccinations for "critical" diseases that include FMD in endemic areas (i.e. the so-called "red zone" in the north of Botswana), anthrax, black quarter and brucellosis. Farmers also do not pay for the insertion and monitoring of boluses that are used to identify individual animals for Botswana's

LITS. During drought years, the government sometimes also subsidizes salt and dicalcium phosphate to encourage use of these inputs. During the last drought, the subsidy was 25 percent. Financial support is sometimes also available to cover the cost of drilling boreholes to establish water points on communal lands.

For this study, the cost of government vaccinations and borehole drilling on communal land (i.e. on cattle-post farms but not on leased 6×6 ranches) are counted as a cost to Botswana separate from the farmer's financial accounts. Because of the absence of more-detailed information, the cost of government vaccinations used in the analyses only reflects the medicine portion of the total vaccination cost and excludes the cost of visits by veterinarians to administer the drugs. Likewise, because of a lack of reliable information, the cost to the government of running the LITS programme is excluded from the financial analysis. With respect to salt and dicalcium phosphate, the analyses are based on production in a "normal" (non-drought) year and the costs of these inputs are billed to the farmer's financial accounts at management levels where they are used.

Capital recovery costs

The annual cost of long-term investment items with a useful life spread over more than one year, including animal handling equipment (corrals, crush pens, fencing, water and feed troughs etc.), water supply (borehole drilling, pumps, reservoirs etc.) and breeding stock, have been estimated for each farm model using the so-called capital-recovery-cost method. Specifically, this cost is the annual payment that will repay the cost of a fixed input over its useful life and provide an economic rate of return on the investment.[185] This approach has the advantage over the simple division of an input's value by its useful life as it accounts for the fact that if the farmer (or other investor) did not purchase the input, the money could have been used for some other on- or off-farm enterprise. The calculation of capital recovery costs is therefore an easy way for to account for long-term depreciation. Given that all inputs wear out and have to be replaced eventually, the analyst needs only to enter into the spreadsheet template the replacement cost of each item (whether it be new or used) and how long the item is expected to last.

Financial indicators

The financial analysis of farm-, feedlot- and butchery-level operations is mainly intended to show annual profits or losses from the enterprise. The calculations of profit are based on familiar equations and can be measured in gross and net terms as follows:

Gross profit = total revenue − variable costs

Net profit = gross profit − capital recovery costs

In these equations, total revenue is measured by the amount of product sold (i.e. total kilograms) multiplied by the price (i.e. BWP/kg). Because beef producers sometimes sell many different products (e.g. weaner calves and steers for fattening, animals of various sizes for slaughter, cull cows, cull bulls etc. for farmers and meat, liver, tripe etc. for butchers) subcalculations of gross revenue for each product may be needed to derive the total gross revenue. From these basic definitions, various other indicators of cost structure and profitability are easy to calculate.

[185] Annual capital recovery cost = purchase price of implement × share of use × capital recovery factor (CRF). CRF = $[(1 + i)^n \times i]/[(1 + i)^{n-1}]$ where i = real interest on savings and n = number of years in the implement's useful life. For a full description of this methodology, see Monke and Pearson (1989).

Farm-level costs

At the farm level, several measures of annual production costs are calculated as described below. For the feedlot and butchery models, the analysis looks only at variable and total costs, including capital recovery in annual terms and per kilogram live weight and CDM-equivalent.

Farmer's variable costs

The inputs used in each model vary by management level and include all vaccines not paid for by government (i.e. pasteurella, lumpy skin, botulism and calf dysentery), acaricides for tick control, deworming treatment, salt supplements, borehole operation and maintenance, repairs and maintenance to animal handling facilities and fencing, transport to and from the farm, livestock purchases (replacement of cull bulls, etc.) and hired labour, including wages and food.

Farmer's total costs excluding herd

This indicator summarizes the farmer's total variable costs (i.e. the costs counted above) plus the annual capital recovery cost of any long-term investment items paid for by the farmer. These investment items include corrals, crush pens, troughs and other animal handing facilities on communal lands plus fencing and borehole development on leased lands (e.g. 6×6 ranch). The replacement value of the standing herd is not counted at this level.

Botswana's total costs excluding herd

This indicator includes all variable and fixed costs paid by farmers plus the cost of government-supplied vaccinations and cost of borehole development on communal lands. As noted, however, the costs of running the DVS vaccination programme and the cost of the LITS system are not included in the analysis.

Total costs including herd

This indicator includes all of the costs identified above (i.e. those paid by the farmer and the Government of Botswana) plus the capital recovery value of the farmer's investment in the standing herd. While cattle owing is to a large extent a "lifestyle" activity in Botswana, cattle owners could decide to liquidate their herd and put the money to work elsewhere. This indicator therefore aims to show the long-run opportunity cost of remaining invested in beef and is the most comprehensive cost measure in the present study.

Per-unit costs

The following indicators help compare costs across enterprises of different sizes and across value-chain stages.

Farmer's variable costs per animal sold

This is calculated by dividing the farmer's total variable costs by the number of livestock sold per year.

Farmer's variable costs per kilogram live weight

Similar to the above, this indicator is calculated by dividing the farmer's total variable costs by the total live-weight sold per year. This indicator is especially useful for comparing costs across value-chain stages, since sales at the feedlot and butchery stages can be converted to their live-weight equivalent.

Farmer's variable cost per kilogram cold dressed mass equivalent

This indicator looks at the farmer's variable costs per equivalent unit of cold dressed mass (CDM) based on the killing-out percentage for live animals. Because the farm-level model may include young animals sold for fattening in a feedlot, however, calculations of costs per kilogram CDM-equivalent at this level include immature animals not yet ready for slaughter.

Botswana's total costs excluding herd per kilogram live weight

This indicator shows the total cost to Botswana per kilogram of live weight sold excluding the capital recovery of the herd but including costs paid for by government (vaccinations, borehole development on communal lands) and by farmers (fencing, animal handling facilities etc.).

Botswana's total costs excluding herd per kilogram cold dressed mass equivalent

Again, because the farm-level analysis includes young animals sold for fattening in a feedlot, the indicator of total costs in CDM-equivalent is before finishing of feedlot animals.

Farm-level profits

The spreadsheet templates have been designed to calculate several measures of producer profits.

Farmer's gross margin

Gross margin is defined as total revenue minus variable costs. This indicator excludes depreciation on fixed assets, but gives a basic picture of annual turnover or cash profits enjoyed by the farmer before capital spending.

Farmer's total profit excluding herd

This indicator is calculated as gross revenue minus the farmer's long-term capital recovery costs excluding the value of breeding stock and shows the ability of the enterprise to cover its long-run operating costs paid by farmers.

Botswana's total profit excluding herd

This indicator is calculated as gross revenue minus the total cost to Botswana excluding the capital value of the standing herd and shows the ability of the enterprise to cover all long-run operating costs including the cost of government vaccinations and water-point development, but excluding costs related to LITS and the administering of vaccines.

Botswana's net profit including herd

This indicator is calculated as gross revenue minus the total cost to Botswana including the capital recovery value of the standing herd and is the most complete measure of net profits. The only major cost items that are excluded at this level are the LITS system and the cost of administering government vaccines.

Per-unit profits

Farmer's gross margin per kilogram live weight and cold dressed mass

Similar to the per unit measures of production costs, farmer gross margins per kilogram live weight and in CDM-equivalent are provided to enable direct comparisons between farm enterprises of different sizes and with margins at other value-chain stages.

Botswana's total profit excluding herd per kilogram live weight and cold dressed mass

These indicators are included to give a more complete picture of total farm level costs in per kilogram live weight and CDM-equivalent terms.

Rates of return

From the definitions above, further calculations showing the rates of return to a farmer's spending and Botswana's total spending are easy to calculate as follows. An enterprise with a high ratio provides a better rate of return to the expenditure on inputs than one with a low ratio.

Farmer's gross margin / farmer's variable costs

Botswana's total profit excluding herd / Botswana's total costs excluding herd

Summary of financial indicators

Base prices (from mid-March 2012)

USD

	Total heads sold (all types)	Total mass sold (kg lw)	Total kg in CDM eqiuvalent*	Gross revenue	Farmer's variable costs	Farmer's total costs ex. herd	Farmer's gross margin	Farmer's total profit ex herd	BW's total costs ex herd	BW's total costs including herd	BW's total profit ex herd	BW's net profit including herd	Farmer's variable costs per head sold	BW's total costs (ex herd) per head sold	Farmer's gross margin per kg lw sold	Farmer's gross margin per kg CDM equivalent*	BW's total profit (ex herd) per kg lw sold	BW's total profit (ex herd) per kg CDM equivalent*
Cattle Post (20-cow)																		
Basic	7.90	2,884	1,413	3,349	3,082	3,294	267	55	3,790	5,384	(441)	(2,035)	390	681	0.09	0.19	(0.15)	(0.31)
Improved	10.07	3,667	1,907	4,297	4,244	4,499	53	(202)	4,997	6,591	(701)	(2,295)	422	655	0.01	0.03	(0.19)	(0.37)
Advanced	12.38	4,579	2,473	5,403	7,707	8,002	(2,304)	(2,599)	8,502	10,096	(3,099)	(4,693)	622	815	(0.50)	(0.93)	(0.68)	(1.25)
Cattle Post (80-cow)																		
Basic	31.61	11,536	5,652	13,395	6,891	7,494	6,503	5,901	8,034	14,281	5,361	(886)	218	452	0.56	1.15	0.46	0.95
Improved	40.27	14,670	7,628	17,188	11,223	11,942	5,964	5,245	12,492	18,739	4,696	(1,551)	279	465	0.41	0.78	0.32	0.62
Advanced	49.53	18,316	9,890	21,612	24,747	25,574	(3,135)	(3,962)	26,133	32,380	(4,521)	(10,768)	500	654	(0.17)	(0.32)	(0.25)	(0.46)
6x6 Ranch (130-cow)																		
Basic	51.36	18,745	9,185	21,766	13,019	16,758	8,747	5,009	18,779	29,075	2,987	(7,309)	254	566	0.47	0.95	0.16	0.33
Improved	65.44	23,838	12,396	27,930	25,466	29,748	2,464	(1,818)	31,783	42,079	(3,853)	(14,149)	389	643	0.10	0.20	(0.16)	(0.31)
Advanced	80.48	29,763	16,072	35,119	42,240	47,066	(7,121)	(11,946)	49,116	59,412	(13,996)	(24,293)	525	738	(0.24)	(0.44)	(0.47)	(0.87)

* Before fattening of feedlot animals.

BWP

	Total heads sold (all types)	Total mass sold (kg lw)	Total kg in CDM eqiuvalent*	Gross revenue	Farmer's variable costs	Farmer's total costs ex. herd	Farmer's gross margin	Farmer's total profit ex herd	BW's total costs ex herd	BW's total costs including herd	BW's total profit ex herd	BW's net profit including herd	Farmer's variable costs per head sold	BW's total costs (ex herd) per head sold	Farmer's gross margin per kg lw sold	Farmer's gross margin per kg CDM equivalent*	BW's total profit (ex herd) per kg lw sold	BW's total profit (ex herd) per kg CDM equivalent*
Cattle Post (20-cow)																		
Basic	7.90	2,884	1,413	23,441	21,572	23,059	1,869	382	26,531	37,689	(3,090)	(14,248)	2,730	4,770	0.65	1.32	(1.07)	(2.19)
Improved	10.07	3,667	1,907	30,078	29,705	31,495	373	(1,416)	34,982	46,140	(4,904)	(16,062)	2,951	4,583	0.10	0.20	(1.34)	(2.57)
Advanced	12.38	4,579	2,473	37,821	53,950	56,012	(16,129)	(18,192)	59,516	70,674	(21,695)	(32,853)	4,357	5,708	(3.52)	(6.52)	(4.74)	(8.77)
Cattle Post (80-cow)																		
Basic	31.61	11,536	5,652	93,763	48,238	52,456	45,524	41,307	56,237	99,967	37,525	(6,204)	1,526	3,163	3.95	8.05	3.25	6.64
Improved	40.27	14,670	7,628	120,313	78,562	83,597	41,751	36,716	87,441	131,171	32,872	(10,858)	1,951	3,257	2.85	5.47	2.24	4.31
Advanced	49.53	18,316	9,890	151,283	173,226	179,021	(21,943)	(27,737)	182,928	226,658	(31,645)	(75,374)	3,498	4,577	(1.20)	(2.22)	(1.73)	(3.20)
6x6 Ranch (130-cow)																		
Basic	51.36	18,745	9,185	152,365	91,136	117,305	61,229	35,060	131,452	203,526	20,912	(51,162)	1,775	3,963	3.27	6.67	1.12	2.28
Improved	65.44	23,838	12,396	195,509	178,264	208,233	17,245	(12,724)	222,481	294,555	(26,972)	(99,046)	2,724	4,501	0.72	1.39	(1.13)	(2.18)
Advanced	80.48	29,763	16,072	245,835	295,681	329,459	(49,846)	(83,624)	343,811	415,885	(97,975)	(170,049)	3,674	5,168	(1.67)	(3.10)	(3.29)	(6.10)

* Before fattening of feedlot animals.

Previous prices (about 19 percent higher on average before price reduction; see Table 24 for details)

USD

	Total heads sold (all types)	Total mass sold (kg lw)	Total kg in CDM eqiuvalent*	Gross revenue	Farmer's variable costs	Farmer's total costs ex. herd	Farmer's gross margin	Farmer's total profit ex herd	BW's total costs ex herd	BW's total costs including herd	BW's total profit ex herd	BW's net profit including herd	Farmer's variable costs per head sold	BW's total costs (ex herd) per head sold	Farmer's gross margin per kg lw sold	Farmer's gross margin per kg CDM equivalent*	BW's total profit (ex herd) per kg lw sold	BW's total profit (ex herd) per kg CDM equivalent*
Cattle Post (20-cow)																		
Basic	7.90	2,884	1,413	3,914	3,082	3,294	832	620	3,790	5,384	124	(1,470)	390	681	0.29	0.59	0.04	0.09
Improved	10.07	3,667	1,907	5,044	4,244	4,499	800	544	4,997	6,591	46	(1,548)	422	655	0.22	0.42	0.01	0.02
Advanced	12.38	4,579	2,473	6,361	7,707	8,002	(1,347)	(1,641)	8,502	10,096	(2,142)	(3,736)	622	815	(0.29)	(0.54)	(0.47)	(0.87)
Cattle Post (80-cow)																		
Basic	31.61	11,536	5,652	15,656	6,891	7,494	8,764	8,162	8,034	14,281	7,622	1,375	218	452	0.76	1.55	0.66	1.35
Improved	40.27	14,670	7,628	20,175	11,223	11,942	8,952	8,232	12,492	18,739	7,683	1,436	279	465	0.61	1.17	0.52	1.01
Advanced	49.53	18,316	9,890	25,443	24,747	25,574	696	(132)	26,133	32,380	(690)	(6,937)	500	654	0.04	0.07	(0.04)	(0.07)
6x6 Ranch (130-cow)																		
Basic	51.36	18,745	9,185	25,440	13,019	16,758	12,421	8,683	18,779	29,075	6,661	(3,635)	254	566	0.66	1.35	0.36	0.73
Improved	65.44	23,838	12,396	32,784	25,466	29,748	7,318	3,036	31,783	42,079	1,001	(9,295)	389	643	0.31	0.59	0.04	0.08
Advanced	80.48	29,763	16,072	41,344	42,240	47,066	(896)	(5,721)	49,116	59,412	(7,771)	(18,068)	525	738	(0.03)	(0.06)	(0.26)	(0.48)

* Before fattening of feedlot animals.

BWP

	Total heads sold (all types)	Total mass sold (kg lw)	Total kg in CDM eqiuvalent*	Gross revenue	Farmer's variable costs	Farmer's total costs ex. herd	Farmer's gross margin	Farmer's total profit ex herd	BW's total costs ex herd	BW's total costs including herd	BW's total profit ex herd	BW's net profit including herd	Farmer's variable costs per head sold	BW's total costs (ex herd) per head sold	Farmer's gross margin per kg lw sold	Farmer's gross margin per kg CDM equivalent*	BW's total profit (ex herd) per kg lw sold	BW's total profit (ex herd) per kg CDM equivalent*
Cattle Post (20-cow)																		
Basic	7.90	2,884	1,413	27,397	21,572	23,059	5,825	4,339	26,531	37,689	866	(10,291)	2,730	4,770	2.02	4.12	0.30	0.61
Improved	10.07	3,667	1,907	35,306	29,705	31,495	5,600	3,811	34,982	46,140	323	(10,834)	2,951	4,583	1.53	2.94	0.09	0.17
Advanced	12.38	4,579	2,473	44,525	53,950	56,012	(9,426)	(11,488)	59,516	70,674	(14,992)	(26,149)	4,357	5,708	(2.06)	(3.81)	(3.27)	(6.06)
Cattle Post (80-cow)																		
Basic	31.61	11,536	5,652	109,589	48,238	52,456	61,351	57,134	56,237	99,967	53,352	9,622	1,526	3,163	5.32	10.85	4.62	9.44
Improved	40.27	14,670	7,628	141,223	78,562	83,597	62,661	57,626	87,441	131,171	53,782	10,052	1,951	3,257	4.27	8.21	3.67	7.05
Advanced	49.53	18,316	9,890	178,099	173,226	179,021	4,873	(922)	182,928	226,658	(4,829)	(48,559)	3,498	4,577	0.27	0.49	(0.26)	(0.49)
6x6 Ranch (130-cow)																		
Basic	51.36	18,745	9,185	178,083	91,136	117,305	86,947	60,778	131,452	203,526	46,630	(25,443)	1,775	3,963	4.64	9.47	2.49	5.08
Improved	65.44	23,838	12,396	229,487	178,264	208,233	51,223	21,255	222,481	294,555	7,006	(65,068)	2,724	4,501	2.15	4.13	0.29	0.57
Advanced	80.48	29,763	16,072	289,411	295,681	329,459	(6,271)	(40,049)	343,811	415,885	(54,400)	(126,474)	3,674	5,168	(0.21)	(0.39)	(1.83)	(3.38)

Derivation of capital recovery costs

DERIVATION OF ANNUAL INVESTMENT COSTS

Capital Recovery Factor (CRF):

CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = real interest on savings; n = number of years in the implement's useful life.

Annual depreciation cost per ha = replacement cost (value new) * CRF * per ha share of total use.

Main Assumptions:

USD 1 = BWP	**7.00**
Real interest on savings (op cost of capital) =	**3.0%**

20-cow Cattle Post - basic

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	Total Replacement Cost (value new) BWP	CRF	Unit Share of Total Use*	Annual Depreciation Cost USD	Annual Depreciation Cost BWP
Value of breeding stock							
Cows (20) - assume BWP 7.50 per kg @ 480kg lw	8	10,286	72,000	0.1425	1.00	1,465	10,257
Bulls (1) - assume BWP 7.50 per kg @ 550kg lw	5	589	4,125	0.2184	1.00	129	901
Replacement value of bore hole (share w/ 5 others)							
Drilling	40	21,429	150,000	0.0433	0.20	185	1,298
Underound pipe	25	10,000	70,000	0.0574	0.20	115	804
Submersible pump	6	1,000	7,000	0.1846	0.20	37	258
Pump houe and engine	15	6,429	45,000	0.0838	0.20	108	754
Resivoir	30	3,571	25,000	0.0510	0.20	36	255
Crush pen and troughs							
Polypipe & fittings (500m from borehole)	8	600	4,200	0.1425	1.00	85	598
Fencing and gates	15	857	6,000	0.0838	1.00	72	503
Drinking troughs (1)	10	257	1,800	0.1172	1.00	30	211
Feeding troughs (0)	15		-	0.0838	1.00	-	-
Animal handling equipment	5	114	800	0.2184	1.00	25	175
TOTAL		**55,132**	**385,925**			**2,288**	**16,013**

20-cow Cattle Post - improved

Description and Quantity	Useful Life	Total Replacement Cost USD	Total Replacement Cost BWP	CRF	Unit Share of Total	Annual Depreciation USD	Annual Depreciation BWP
Value of breeding stock							
Cows (20) - assume BWP 7.50 per kg @ 480kg lw	8	10,286	72,000	0.1425	1.00	1,465	10,257
Bulls (1) - assume BWP 7.50 per kg @ 550kg lw	5	589	4,125	0.2184	1.00	129	901
Replacement value of bore hole (share w/ 5 others)							
Drilling	40	21,429	150,000	0.0433	0.20	185	1,298
Underound pipe	25	10,000	70,000	0.0574	0.20	115	804
Submersible pump	6	1,000	7,000	0.1846	0.20	37	258
Pump houe and engine	15	6,429	45,000	0.0838	0.20	108	754
Resivoir	30	3,571	25,000	0.0510	0.20	36	255
Crush pen and troughs							
Polypipe & fittings (500m from borehole)	8	600	4,200	0.1425	1.00	85	598
Fencing and gates	15	1,286	9,000	0.0838	1.00	108	754
Drinking troughs (1)	10	257	1,800	0.1172	1.00	30	211
Lick troughs (1)	15	50	350	0.0838	1.00	4	29
Animal handling equipment	5	129	900	0.2184	1.00	28	197
TOTAL		**55,625**	**389,375**			**2,331**	**16,316**

20-cow Cattle Post - advanced

Description and Quantity	Useful Life	Total Replacement Cost USD	Total Replacement Cost BWP	CRF	Unit Share of Total	Annual Depreciation USD	Annual Depreciation BWP
Value of breeding stock							
Cows (80) - assume BWP 7.50 per kg @ 480kg lw	8	10,286	72,000	0.1425	1.00	1,465	10,257
Bulls (3) - assume BWP 7.50 per kg @ 550kg lw	5	589	4,125	0.2184	1.00	129	901
Replacement value of bore hole (share w/ 5 others)							
Drilling	40	21,429	150,000	0.0433	0.20	185	1,298
Underound pipe	25	10,000	70,000	0.0574	0.20	115	804
Submersible pump	6	1,000	7,000	0.1846	0.20	37	258
Pump houe and engine	15	6,429	45,000	0.0838	0.20	108	754
Resivoir	30	3,571	25,000	0.0510	0.20	36	255
Crush pen and troughs							
Polypipe & fittings (500m from borehole)	8	600	4,200	0.1425	1.00	85	598
Fencing and gates	15	1,714	12,000	0.0838	1.00	144	1,005
Drinking troughs (1)	10	257	1,800	0.1172	1.00	30	211
Lick troughs (1)	15	50	350	0.0838	1.00	4	29
Animal handling equipment	5	143	1,000	0.2184	1.00	31	218
TOTAL		**56,068**	**392,475**			**2,370**	**16,589**

DERIVATION OF ANNUAL INVESTMENT COSTS

Capital Recovery Factor (CRF):

CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = real interest on savings; n = number of years in the implement's useful life.

Annual depreciation cost per ha = replacement cost (value new) * CRF * per ha share of total use.

Main Assumptions:

USD 1 = BWP	**7.00**
Real interest on savings (op cost of capital) =	**3.0%**

80-cow Cattle Post - basic

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	BWP	CRF	Unit Share of Total Use*	Annual Depreciation Cost USD	BWP
Value of breeding stock							
Cows (80) - assume BWP 7.50 per kg @ 480kg lw	8	41,143	288,000	0.1425	1.00	5,861	41,027
Bulls (3) - assume BWP 7.50 per kg @ 550kg lw	5	1,768	12,375	0.2184	1.00	386	2,702
Replacement value of bore hole (share w/ 5 others)							
Drilling	40	21,429	150,000	0.0433	0.20	185	1,298
Underound pipe	25	10,000	70,000	0.0574	0.20	115	804
Submersible pump	6	1,000	7,000	0.1846	0.20	37	258
Pump houe and engine	15	6,429	45,000	0.0838	0.20	108	754
Resivoir	30	3,571	25,000	0.0510	0.20	36	255
Crush pen and troughs							
Polypipe & fittings (500m from borehole)	8	600	4,200	0.1425	1.00	85	598
Fencing and gates	15	4,286	30,000	0.0838	1.00	359	2,513
Drinking troughs (4)	10	1,029	7,200	0.1172	1.00	121	844
Lick troughs (0)	15	-	-	0.0838	1.00	-	-
Animal handling equipment	5	171	1,200	0.2184	1.00	37	262
TOTAL		**91,425**	**639,975**			**7,331**	**51,316**

80-cow Cattle Post - improved

Description and Quantity	Useful Life	Total Replacement Cost USD	BWP	CRF	Unit Share of Total	Annual Depreciation USD	BWP
Value of breeding stock							
Cows (80) - assume BWP 7.50 per kg @ 480kg lw	8	41,143	288,000	0.1425	1.00	5,861	41,027
Bulls (3) - assume BWP 7.50 per kg @ 550kg lw	5	1,768	12,375	0.2184	1.00	386	2,702
Replacement value of bore hole (share w/ 5 others)							
Drilling	40	21,429	150,000	0.0433	0.20	185	1,298
Underound pipe	25	10,000	70,000	0.0574	0.20	115	804
Submersible pump	6	1,000	7,000	0.1846	0.20	37	258
Pump houe and engine	15	6,429	45,000	0.0838	0.20	108	754
Resivoir	30	3,571	25,000	0.0510	0.20	36	255
Crush pen and troughs							
Polypipe & fittings (500m from borehole)	8	600	4,200	0.1425	1.00	85	598
Fencing and gates	15	5,357	37,500	0.0838	1.00	449	3,141
Drinking troughs (4)	10	1,029	7,200	0.1172	1.00	121	844
Lick troughs (2)	15	100	700	0.0838	1.00	8	59
Animal handling equipment	5	257	1,800	0.2184	1.00	56	393
TOTAL		**92,682**	**648,775**			**7,448**	**52,134**

80-cow Cattle Post - advanced

Description and Quantity	Useful Life	Total Replacement Cost USD	BWP	CRF	Unit Share of Total	Annual Depreciation USD	BWP
Value of breeding stock							
Cows (80) - assume BWP 7.50 per kg @ 480kg lw	8	41,143	288,000	0.1425	1.00	5,861	41,027
Bulls (3) - assume BWP 7.50 per kg @ 550kg lw	5	1,768	12,375	0.2184	1.00	386	2,702
Replacement value of bore hole (share w/ 5 others)							
Drilling	40	21,429	150,000	0.0433	0.20	185	1,298
Underound pipe	25	10,000	70,000	0.0574	0.20	115	804
Submersible pump	6	1,000	7,000	0.1846	0.20	37	258
Pump houe and engine	15	6,429	45,000	0.0838	0.20	108	754
Resivoir	30	3,571	25,000	0.0510	0.20	36	255
Crush pen and troughs							
Polypipe & fittings (500m from borehole)	8	600	4,200	0.1425	1.00	85	598
Fencing and gates	15	6,429	45,000	0.0838	1.00	538	3,769
Drinking troughs (4)	10	1,029	7,200	0.1172	1.00	121	844
Lick troughs (2)	15	100	700	0.0838	1.00	8	59
Animal handling equipment	5	343	2,400	0.2184	1.00	75	524
TOTAL		**93,839**	**656,875**			**7,556**	**52,893**

DERIVATION OF ANNUAL INVESTMENT COSTS

Capital Recovery Factor (CRF):

CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = real interest on savings; n = number of years in the implement's useful life.

Annual depreciation cost per ha = replacement cost (value new) * CRF * per ha share of total use.

Main Assumptions:

USD 1 = BWP	**7.00**
Real interest on savings (op cost of capital) =	**3.0%**

6x6 Ranch - basic

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	BWP	CRF	Unit Share of Total Use*	Annual Depreciation Cost USD	BWP
Value of breeding stock							
Cows (130) - assume BWP 7.50 per kg @ 480kg lw	8	66,857	468,000	0.1425	1.00	9,524	66,670
Bulls (5) - assume BWP 7.50 per kg @ 550kg lw	5	3,536	24,750	0.2184	1.00	772	5,404
Replacement value of bore hole (4-own boreholes)							
Drilling	40	85,714	600,000	0.0433	0.20	742	5,191
Underound pipe	25	40,000	280,000	0.0574	0.20	459	3,216
Submersible pump	6	4,000	28,000	0.1846	0.20	148	1,034
Pump houe and engine	15	25,714	180,000	0.0838	0.20	431	3,016
Resivoir	30	14,286	100,000	0.0510	0.20	146	1,020
Crush pen and troughs							
Polypipe & fittings (near borehole)	8	286	2,000	0.1425	1.00	41	285
Fencing and gates	15	8,571	60,000	0.0838	1.00	718	5,026
Drinking troughs (12)	10	1,200	8,400	0.1172	1.00	141	985
Lick troughs (0)	15			0.0838	1.00	-	-
Animal handling equipment	5	686	4,800	0.2184	1.00	150	1,048
Fencing and gates (6 paddocks)		-					
Boundary fence (24km @ BWP 7,450 per km)	20	25,543	178,800	0.0672	1.00	1,717	12,018
Paccock fences (12km @ BWP 6,850 per km)	18	11,743	82,200	0.0727	1.00	854	5,977
Gates (8 @ 990 each + BWP 250 for posts and install)	15	1,417	9,920	0.0838	1.00	119	831
TOTAL		**289,553**	**2,026,870**			**15,960**	**111,721**

6x6 Ranch - improved

Description and Quantity	Useful Life	Total Replacement Cost USD	BWP	CRF	Unit Share of Total	Annual Depreciation USD	BWP
Value of breeding stock							
Cows (130) - assume BWP 7.50 per kg @ 480kg lw	8	66,857	468,000	0.1425	1.00	9,524	66,670
Bulls (5) - assume BWP 7.50 per kg @ 550kg lw	5	3,536	24,750	0.2184	1.00	772	5,404
Replacement value of bore hole (4-own boreholes)							
Drilling	40	85,714	600,000	0.0433	0.20	742	5,191
Underound pipe	25	40,000	280,000	0.0574	0.20	459	3,216
Submersible pump	6	4,000	28,000	0.1846	0.20	148	1,034
Pump houe and engine	15	25,714	180,000	0.0838	0.20	431	3,016
Resivoir	30	14,286	100,000	0.0510	0.20	146	1,020
Crush pen and troughs							
Polypipe & fittings (near borehole)	8	286	2,000	0.1425	1.00	41	285
Fencing and gates	15	8,571	60,000	0.0838	1.00	718	5,026
Drinking troughs (12)	10	1,200	8,400	0.1172	1.00	141	985
Lick troughs (4)	15	1,029	7,200	0.0838	1.00	86	603
Animal handling equipment	5	686	4,800	0.2184	1.00	150	1,048
Fencing and gates		-					
Boundary fence (24km @ BWP 7,450 per km)	20	25,543	178,800	0.0672	1.00	1,717	12,018
Paccock fences (18km @ BWP 6,850 per km)	18	17,614	123,300	0.0727	1.00	1,281	8,965
Gates (10 @ 990 each + BWP 250 for posts and install)	15	1,771	12,400	0.0838	1.00	148	1,039
TOTAL		**296,807**	**2,077,650**			**16,503**	**115,520**

6x6 Ranch - advanced

Description and Quantity	Useful Life	Total Replacement Cost USD	BWP	CRF	Unit Share of Total	Annual Depreciation USD	BWP
Value of breeding stock							
Cows (130) - assume BWP 7.50 per kg @ 480kg lw	8	66,857	468,000	0.1425	1.00	9,524	66,670
Bulls (5) - assume BWP 7.50 per kg @ 550kg lw	5	3,536	24,750	0.2184	1.00	772	5,404
Replacement value of bore hole (4-own boreholes)							
Drilling	40	85,714	600,000	0.0433	0.20	742	5,191
Underound pipe	25	40,000	280,000	0.0574	0.20	459	3,216
Submersible pump	6	4,000	28,000	0.1846	0.20	148	1,034
Pump houe and engine	15	25,714	180,000	0.0838	0.20	431	3,016
Resivoir	30	14,286	100,000	0.0510	0.20	146	1,020
Crush pen and troughs							
Polypipe & fittings (near borehole)	8	286	2,000	0.1425	1.00	41	285
Fencing and gates	15	8,571	60,000	0.0838	1.00	718	5,026
Drinking troughs (12)	10	1,200	8,400	0.1172	1.00	141	985
Lick troughs (6)	15	1,543	10,800	0.0838	1.00	129	905
Animal handling equipment	5	686	4,800	0.2184	1.00	150	1,048
Fencing and gates		-					
Boundary fence (24km @ BWP 7,450 per km)	20	25,543	178,800	0.0672	1.00	1,717	12,018
Paccock fences (24km @ BWP 6,850 per km)	18	23,486	164,400	0.0727	1.00	1,708	11,953
Gates (15 @ 990 each + BWP 250 for posts and install)	15	2,657	18,600	0.0838	1.00	223	1,558
TOTAL		**304,079**	**2,128,550**			**17,047**	**119,329**

DERIVATION OF ANNUAL INVESTMENT COSTS

Capital Recovery Factor (CRF):

CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = real interest on savings; n = number of years in the implement's useful life.

Annual depreciation cost per ha = replacement cost (value new) * CRF * per ha share of total use.

Main Assumptions:

USD 1 = BWP	**7.00**
Real interest on savings (op cost of capital) =	**3.0%**

Small butcher - 5 carcasas per week

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	Total Replacement Cost (value new) BWP	CRF	Unit Share of Total Use*	Annual Depreciation Cost USD	Annual Depreciation Cost BWP
Building	45	120,000.0	840,000	0.0408	1.00	4,894	34,260
Cold room	12	5,714	40,000	0.1005	1.00	574	4,018
Bench saw	6	2,857	20,000	0.1846	1.00	527	3,692
Display fridge	8	2,857	20,000	0.1425	1.00	407	2,849
Scale (with computer pricing)	5	2,143	15,000	0.2184	1.00	468	3,275
Hanging scale	5	286	2,000	0.2184	1.00	62	437
Bowels, trays, knives, clothing	2	357	2,500	0.5226	1.00	187	1,307
Cutting table (2)	8	1,000	7,000	0.1425	1.00	142	997
Mincer	8	571	4,000	0.1425	1.00	81	570
Cleaning implements (mops, brooms)	2	71	500	0.5226	1.00	37	261
Plastic wrapping machine	3	121	850	0.3535	1.00	43	301
Cash register	6	286	2,000	0.1846	1.00	53	369
Meat hooks	15	107	750	0.0838	1.00	9	63
Other items	2	357	2,500	0.5226	1.00	187	1,307
TOTAL		**136,729**	**957,100**			**7,672**	**53,705**

Annex 6 – Key informants

Name	Function	Organization	Place	E-mail
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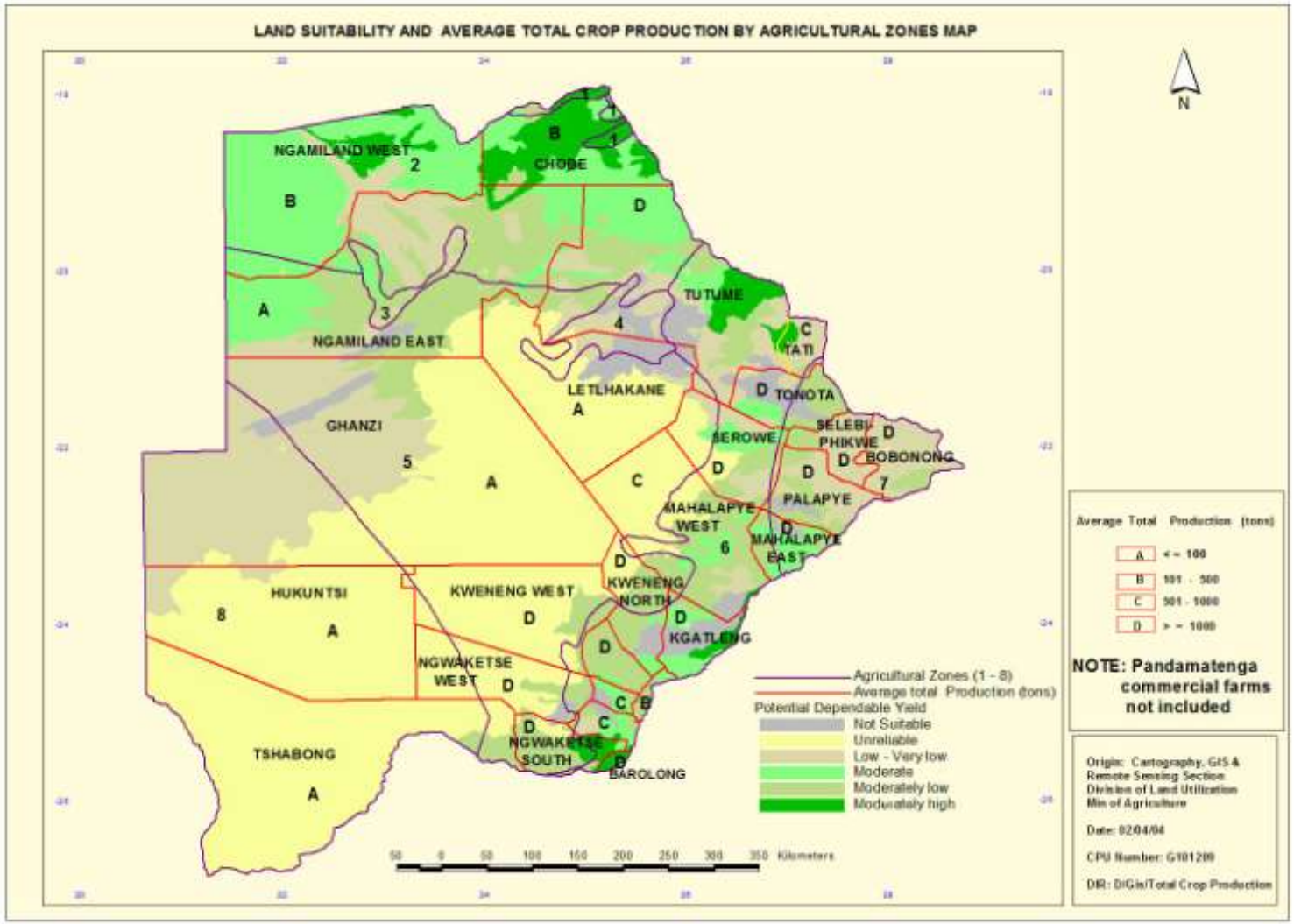
Annex 7 – Botswana's agro-ecological zones and crop suitability



Agro-climatic zone	Agricultural district/area	Climate	Soils	Recommended crops
1 SA (0.02%)	Chobe (Kachikau, Kasane and Pandamatenga)	Rainfall = 600–700 mm Av. temp.: summer 18–33 °C, winter 12–30 °C ETp = 1330 mm Day length = 11–13.25 hrs Humidity = 40–50% (Aug–Nov) 50–70% (Dec–June)	Soils >1 m deep, sandy loam – silt clay and loam – heavy clay. Well to poorly drained, Higher water table, pH = 6.0–9.0. Some low in nutrients. In Pandamatenga high in K and low in N and P and also difficult to work. Salinity 1–5 mmhos/cm (up to 1 m) and 6–9 mmhos/cm (1 m +)	Maize, sorghum, sunflower, cotton, cowpea, groundnut, lablab, millet, soybean, mung bean, pigeon pea, tobacco, cassava, beans, sugar cane, wheat
2 SA (20%)	Chobe, Okavango, Ngamiland E and W	Rainfall = 500–600 mm Av. temp.: summer 24–27 °C, winter 16–25 °C ETp = 1350 mm Day length = 11–13.50 hrs Humidity = 40–70% (Jan–June); 30–40% (Aug–Nov) Light frosts May–Aug	Soils generally deep, some calcrete. Fine to medium sands, silty clay with excessive drainage. pH = 4.0–6.5 (sands), 6.7–8.5 (clays). Light soils poor in all important nutrients. Salinity 0–0.02 mmhos/cm	Maize, sorghum, sunflower, cotton, cowpea, groundnut, lablab, millet, soybean, pigeon pea, tobacco, cassava, beans, castor seed, sesame
3 SA (1.0%)	Ngamiland East	Rainfall = 450–550 mm Av. temp.: summer 23–37 °C, winter 17– 25 °C ETp = 1400 mm Day length = 11–13.50 hrs Humidity = 40–70% (Jan–June); 20–40% (Aug–Oct) Light frosts May–Aug	Soils generally deep (1–2 m). Fine sands, sandy loam, silt, clay loams, sandy clays and clay with excessive drainage to well drained. pH = 6.0–8.5. Low to medium nutrients status. Salinity 0–0.2 mmhos/cm	Maize, sorghum, sunflower, cotton, cowpea, groundnut, lablab, millet, soybean, pigeon pea, tobacco, beans, castor seed, sesame, melons
4 SA (1.8%)	Tutume and Letlhakane (Makgadikgadi pans)	Rainfall = 450–550 mm Av. temp.: summer 24–27 °C, winter 16–22 °C Day length = 11.7–13.4 hrs Humidity = 40–60% (Jan–June); 25–45% (Aug–Nov) Frost possibility May–Aug	Soils 1–3 m deep, medium to poor drainage, calcrete often near surface. Heavy clays, some silts and fine sands. pH = 7.0–10.0. Poor to medium nutrient status. Salinity 0.2–0.4 mmhos/cm	Sorghum, millet, castor seed, date palm
5 SA (34%)	Ngamiland East, Letlhakane, Gantsi, Kweneng W and N, Ngwaketse W and S, Ngamiland W, Serowe, Mahalapye	Rainfall = 350–500 mm Av. temp.: summer 24– 27 °C, winter 14–23 °C Day length = 10.8–13.45 hrs Humidity = 45–70% (Jan–June); 28–48% (Aug–Nov) Frost possibility May–Sept	Soils >1 m deep, good drainage. Medium to fine sands, few areas with sandy loams and clay loams. pH = 5.3–6.5 (sands), 6.7–7.5 (loams), 8.0–9.0 (pans). Very poor to poor in nutrients, occasionally medium. Salinity low or absent except pans	Sorghum, sunflower, cowpea, groundnut, lablab, millet, soybean, beans, castor seed, sesame, melons, sweet reed, Bambara groundnut, mung bean

Agro-climatic zone	Agricultural district/area	Climate	Soils	Recommended crops
6 SA (16.5%)	Tutume, Masunga, Tonota, Palapye, Mahalapye, Serowe, Machaneng, Kgatleng, Kweneng N and S, Bamalete/Tlokweng, Barolong, Ngwaketse N, S and C	Rainfall = 400–500 mm Av. temp.: summer 20– 27 °C, winter 8–16 °C Day length > 13 hrs most of the year; < 13 hrs Feb/Mar Humidity = 45–70% (Jan–June); 28–48% (Aug–Nov) Frost possibility June–Sept	Soils up to 2 m deep (av. 1 m), well to excessively drained, except clays. Stony to sandy loam, loam and clay. Majority sandy loams and loamy sands. pH = 4.8–6.2 (sand, loam), 6.5–7.2 (black clay). Low to moderate nutrients. Salinity 0 to low	Maize, sorghum, sunflower, cotton, cowpea, groundnut, lablab, millet, soybean, tobacco, beans, castor seed, sesame, wheat, melons, sweet reed, Bambara groundnut, tobacco, mung bean
7 SA (3.8%)	S/Phikwe, Bobonong, Machaneng, Palapye and Tonota	Rainfall = 350–450 mm Av. temp.: summer 15.6–33 °C, winter 1.9–30.2 °C Day length 10.75–13.50 hrs Humidity = 65–75% (Dec–July); 61–63% (Aug–Nov)	Soils 0.3–1.5 m deep, sandy loam, loam, silty clay and clay with good to imperfect drainage. pH = 5.6– 6.4 (sandy), 6.5– 7.2 (clays). Low to moderate nutrients. Salinity insignificant	Maize, sunflower, sorghum, cowpea, groundnut, lablab, millet, soybean, castor seed, sesame, melons, sweet reed, Bambara groundnut, tobacco, mung bean
8 A (22.6%)	Tsabong, Hukuntsi, Gantsi, Ngwaketse West	Rainfall = 200–400 mm Av. temp.: summer 23–27 °C, winter 12–24 °C Frost prevalent May–Sept Season later than in other zones Day length = 10.5–13.75 hrs Humidity = 40–78% (Jan–June) 20–50% (Aug–Nov)	Soils >1 m deep, medium–fine sands; very few areas (depressions) with heavier soils; excessive to good drainage. pH = 4.8–7.0 (sands), 7.9–9.6 (pans). Very low to medium nutrient status. Saline in pans	Sorghum, sunflower, cowpea, lablab, millet, castor seed, melons, sweet reed

ETp = potential evapotranspiration; SA = semi arid; A = arid.

It should be borne in mind that each crop recommended in a specific zone can be grown only in localized areas within the zone.

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